

The Mining Journal

RAILWAY AND COMMERCIAL GAZETTE

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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35 East Van, £4 1/2.	25 Roman Gravels, £7 1/2.
10 Grogwin, £23 1/2.	30 Rookhope, 17s. 6d.
25 Glenroy, £23 1/2.	30 Javali, 5s.
5 Great Lacey, £19 1/2.	10 Tankerville, £4.
30 Leadhills, £3 1/2.	5 Van, £22 1/2.
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3 D'Ersey Mountain, 100 Ditto Preference, 150 Tolgus Consols.
5 Dolcoath, 75 Leadhills, 20 Van.
100 East Chiverton, 100 Llanrwst, 27 West Chiverton.
20 East Pool, 163 Pandora, 200 West Pateley Bridge.
50 East Van, 100 Pateley Bridge, 120 West Tankerville.
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CLAUSTHAL MINING SCHOOL NOTES—No. LXXIV.*

BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,
Certificated Mining Engineer.

(Formerly Student at the Royal Bergakademie, Clausthal).
(The Author reserves the right of reproduction.)

SECTION V.

Another mode of timbering wide and slightly inclined lodes is the following, which presupposes a hanging wall of a broken character, the width of the lode being about 13 ft. A strong stempel is notched into the lying wall, and driven tight at the opposite end against a wall plate laid close against the hanging wall: the upper sides of the roof stempels are lagged with covering wood. Immediately beneath the roof stempel, and also notched in the same hole, (which must, therefore, be twice as long as usual), is a second stempel, or rather strut, about half the length of the first, against which it is laid, the opposite end resting or supporting a longitudinal bearer, which runs along and beneath the centre of the roof stempels; the bearers are supported from beneath by upright props, about 7 ft. high, resting on longitudinal sleepers. The longitudinal bearers are further secured by struts, which are secured at their lower ends by being notched in the wall plates at a height of 6 ft. above the floor of the level.

The following is an example of the timbering for a level in a lode 24 ft. wide, and which dips nearly vertically. A long stempel of 18 in. square timber is notched well into both sides of the lode. Upon this two rafters, 18 ft. long, made of 15 in. square timbers, form the sides of an isosceles triangle, the upper ends of the rafters abutting close against each other at their upper ends, and abutting against the corners formed by the floor stempel and the walls of the lode at their lower ends, which thus rest upon the floor stempel, and are prevented from sliding outwards by the walls of the lode. The outside of these rafters are well lagged, and carefully covered over with attle, which is filled above to a considerable height. It is really the attle refuse which receives the thrust between the walls of the lode, the timbering having merely the weight of the attle to carry. Beneath and strengthening the first pair of rafters is a second, made from timber 12 in. square, which are strutted apart at a height of 6 ft. above the floor stempel by a short horizontal cross strut, which serves to strengthen the triangular frame against the side thrust of the walls of the lode.

In the case of a lode with a hanging wall, which though offering no very secure footing for that end of the stempel resting against it, is nevertheless sufficiently strong to dispense with the use of a wall plate, recourse is generally had to longitudinal bearers beneath that end of the stempel, in order to support it; the longitudinal bearers being supported by inclined struts notched into the lying wall.

(F) SPILLING OR PILING THROUGH QUICK GROUND.—The object of spilling (or piling as it is often called) is to penetrate through ground which is of such a loose or quick nature that any excavated space will not stand open for a sufficient length of time to allow of the timbering being brought in in the usual manner, and consequently that the timbering of the level or drift must take place simultaneously with its excavation; indeed, where the ground is of an excessively quick nature it may even be necessary that the timbering precede the excavation (that is the timbering must be driven into the loose ground). It differs, therefore, essentially from that we have previously considered, inasmuch that in the former the work of excavation precedes more or less that of timbering. In this latter we have now to discuss, the timbering of the level either takes place simultaneously with or precedes the work of excavation.

The use of this description of timbering may be necessary in driving through the "old man" of metalliferous mines, or the goals of stratified coal mines, or stratified deposits in loose rolling ground or sand, in soft clays or marls, which are liable to swell out, in driving through faulty broken ground in the neighbourhood of throws, and in the worst case through so called swimming ground, or quicksand, in which the ground is in such small pieces that the timbering shall everywhere fit or close tight.

As in the cases we have before considered, it may only be necessary to support the roof with spilling, or the roof and one or both sides; and in extreme cases not only both sides, roof, and floor, but even the working face, as in driving through swimming ground or quicksand.

This kind of timbering in most cases consists of the repetition of a special combination or set of timbering of greater or less length, and which if properly designed should fit in with each other, the end of one set forming the natural and suitable commencement for the next, and leading to a solid connection of each set with the previous and succeeding ones. One of the principal advantages of this description of timbering is the facility which it affords for the replacing and renewal of any single piece or number of pieces, in cases where the renewal of the timbering is a necessity of not infrequent occurrence.

As we have done in previous lectures, we shall proceed from describing the simplest case, where the roof only requires to be supported by spilling, and to the more complicated cases, where the spilling of the sides and floor is necessary; and, lastly, where the ground is of such a quick character that the support of the working face must be resorted to.

The spilling of the roof alone is a case which occurs but seldom in stratified mines, but may often be necessary in vein mining, owing to the loose or granular texture of the matrix of the lode, or where the roof timbering which supports the attle above the level has become rotten, and given way, letting down the loose attle into the level, and which must be driven through to reopen the latter.

Before the work of spilling is commenced a sufficient number of piles, or spills, must be provided. These should be cut at the surface. In many cases the "Schwarten," which we have previously described, are used for this purpose; they have, however, the sharp edges sawn or planed off, so that the pile when finished, although thinner at the front end, is of the same breadth from end. According to Von Carnall and Krug von Nidda, the surfaces of the piles should be cut parallel to the fibres of the wood; this, however, would allow only of the centre portion of a stem being used, and the use of Schwarten would be inadmissible. In many cases where round wood of suitable dimensions can be obtained this is used, planing or sawing of the wood on two sides, especially if the taper is but slight, is unnecessary. When half round wood is used it is often usual to plane the two edges and the flat face of the pile. In the case of swimming ground, or quick sand, the piles are often made of plank wood, which is planed on all four faces, so that they may fit close against each other. When Schwarten piles are used, and the narrower end (since they cannot always be made parallel) is inserted first, and where a great number have been inserted, and made to fit close against each other, the space of ground at the front end, covered by the piles, will be much narrower than that at the back, where the individual piles are broader. Indeed, if no special arrangements were used it might occur that when the back end was completely covered, and no space was left for the insertion of another pile, there might be large gaps left in the front end, through which the loose ground would fall. These spaces are sometimes afterwards covered in by the insertion of shorter piles at the front end; it is better, however, to avoid these gaps altogether by making the corner or side piles broader at the front end than at the back. At the Friederichs Mine, near to Tarnowitz, the corner piles were made trapezoidal in shape, the front end being twice the breadth of the back end. In other cases it is usual to insert the piles alternately with the broad and narrow ends first,

* Being Notes on a Course of Lectures on Mining, delivered by Herr Bergsrath, Dr. von GROSSACK, Director of the Royal Bergakademie, Clausthal, the Harz, North Germany.

so that the space of ground covered remains approximately the same. The piles vary from 1 in. to 2½ in. in thickness, and from 5 in. to 8 in. in breadth, seldom greater, owing to the liability they then offer to splitting when being driven up with the hammer. Their length should exceed by about 6 in. the space which they are required to cover (that is the distance between the stempels on which the front and back ends rest). This is usually from 6 ft. to 7 ft. Where the piles meet with considerable resistance in penetrating the ground the back ends are liable to suffer, and may even be split with heavy blows from the driving hammer. To obviate this several oblong rings, 1½ in. broad, are provided, to slip over the end of the piles, which are cut slightly taper to receive the rings, and which in case they do not fit sufficiently tight may be fastened on the end with wooden wedges. In place of the iron rings, or even where they are used, recourse may be had to wooden chocks held against the end of the pile. The front end of the pile is usually sharpened by cutting the upper side, where there is great liability that the front end of the pile may become much depressed by the ground above, it will be well to sharpen the pile off on the under side; this will give the latter a tendency to rise as it is being driven in. Lastly, both sides of the pile may be cut (equally or unequally) to form the sharpening of the front end. This sharpening is to enable the pile to penetrate the ground more easily than it would do were the end perfectly flat. In addition to this, the liability of the pile to split is further diminished by taking off the four corners. Where round wood is used the front end is sharpened by cutting it conically. The best material for the piles is undoubtedly oak, owing to its hardness and strength, and that the planed surfaces offer less frictional resistance to being driven in than other kinds. It is, however, so expensive that pine is generally used for this purpose.

THE PARIS INTERNATIONAL EXHIBITION.

No. II.

[FROM OUR OWN CORRESPONDENT.]

The principal Exhibition building is considered to be a temporary structure, and is situate in that portion of the Champ de Mars on the south side of the Seine from the Place du Trocadéro, and to get to it we have to travel from the Palace du Trocadéro through the ornamental pleasure grounds and over the Pont d'Orsay to the Quai D'Orsay. We then come to other ornamental pleasure grounds leading directly to the principal entrance of the grand vestibule of the Exhibition building. The distance from the Trocadéro Palace, measured in a direct line to the entrance of the grand vestibule, is 2250 ft.; this structure is of a rectangular form, being 2315 ft. in length by 1145 ft. in width, which encloses a space of more than 293,751 yards; its extreme southern end extends to the Avenue de Lamotte-Piquet, on the other side of which is the Ecole Militaire. The grand vestibule at the ends of the building form the principal façades, which are flanked by lofty domed towers, the general line of the building being relieved by the large central dome. There is a difference of level from that part of the Champ de Mars near the Ecole Militaire to the Quai D'Orsay of about 13 ft. The northern portion of the floor of the Exhibition is laid upon a system of columns and girders. The natural fall of the ground being towards the Seine, advantage was taken of it to form a basement or underground hall of large size underneath that portion of the Exhibition.

The principal entrance to the grand vestibule is about 800 ft. from the Seine; the towers at the end of the vestibules are connected to a very lofty hall of 116 ft. 9 in. span, the outer side of which is also flanked by a low gallery, 39 ft. 4 in.; from this gallery a roof of about 16 ft. 4 in. in width projects, which runs the whole length of the building. The space enclosed between the end vestibules and also the longitudinal halls are covered for a width of some 295 ft. The space on each side of the longitudinal halls is divided into six divisions or bays, and three of these have spans as much as 82 ft. each; the other three have spans of 16 ft. 4 in., forming arcades which separate the larger galleries. These arcades greatly facilitate the convenience and circulation of visitors to the Exhibition.

Independent of the vestibules and galleries of art, the covered portion of the main Exhibition building is about 2148 ft. in length by 937 ft. in width. There is also a central space of 2148 ft. in length by 213 feet in width; the greater portion of this space is employed for the purposes of the art galleries, which are divided into two main or principal parts, each of which is connected at one end by the vestibules. Access is also gained to the central dome from these points. The galleries referred to measure about 820 ft. long by 125 ft. wide, and there is left on each side of the galleries and the building a space of some 42 ft. There is also a space of about 525 ft. in length between the ends of the galleries, which space occupies the centre of the building. The building is also divided into three equal parts by narrow passages or transepts. The central lines of division of these transepts coincide with that of the small vestibules, which are situate at the inner end of the picture galleries.

In brief terms, therefore, we may consider that the Exhibition presents four leading or distinct features—i.e., the end vestibules, the division of bays of roofs, which are 16 in number, half on one side and half on the other, joined to the vestibules, leaving a large central space between them, the two buildings for the front galleries, and lastly, the central space set apart between the ends of these galleries. The vestibules are 1145 ft. long by 85 ft. wide each, and to the centre of the roof the height is considerable—that is to say, about 64 ft. The distance of the line of springing is some 49 ft. As we have previously noted, the monotony of the roof line is greatly relieved by the three domes which rise above it, one at each end, and the other in the centre of the principal façade; they are of similar appearance and construction. The domes are each constructed on four ribs of a semicircular form, and the springing level commences from the top of four columns which support the whole structure of the dome, the adjoining walls acting merely as a kind of screen. There are a series of iron columns 49 ft. in length each, and set at a distance of 39 ft. apart; they rise to the springing line of the roof, and support the roof of the vestibule itself. There is some little difference in the form of these columns. The drainage of the roof is conducted through a small pipe inserted in these columns, and there is also a very light ladder placed to each of them, which is certainly a very useful contrivance for the purpose of gaining easy access to any part of the roof. The whole area or space between the doors of the roof along the façade is filled with glass in iron frames. The opposite side of the vestibule is glazed in the same way. The covering of the roof consists of three thicknesses of timber, the whole being covered with zinc roofing plates. The greatest height of the building from the ground to the ridge of the roofs is nearly 72 ft. As we have already mentioned, the 16 divisions or bays of roofing connecting the vestibules from the chief portion of the Exhibition building are grouped into parts, each having 8 divisions.

The principal entrance to the Machinery Halls is gained through the doors immediately under the end domes of the vestibules; each of these halls is 2116 ft. long between the corner pavilions by 137 ft. 9 in. wide from the centres of the supporting columns. The height of this hall is 81 ft. from the ground to the top of the roof, and there is a small gallery of inspection running over the ridge of the roof. The roof of this hall is covered in a similar manner to the vestibules. There is an iron structure of columns and girders running down the entire centre of the two machinery halls for the purpose of carrying the shafting. Any machinery that may be placed at the side of the building will be driven by power communicated by shafting laid beneath the floor. There are two small bays on the extreme sides reaching the machinery halls, and the entire width beyond the end line of the vestibules. As heretofore remarked, the picture galleries occupy a central position between the two sections of buildings referred to. Their greatest width is 128 ft.; there is left an open space of 42 ft. wide between the side walls and the adjoining buildings.

The French Machinery Hall is divided into 11 parts or sections, and when all is complete will contain machines in motion. There is a double system for the transmission of power placed in the centre over head, and to this is connected one or two motors which drive the machinery exhibited. This machinery will be seen from all sides, but the space made available for exhibitors will be reduced

by this arrangement. The work of driving the machines, however, much facilitated. The force made available for each division or section is from 60 to 80-horse power; the aggregate power employed in the whole hall is from 600 to 800-horse power, being 500-horse power more than was employed in the Exhibition of 1867. The main shafting is 3½ in. in diameter, and will be driven at a speed equivalent to 120 revolutions per minute. At the principal pulleys, however, the shafting is increased to a diameter of 4 in. The arrangement for the transmission of power by the shafting insures great rigidity, which is a matter of great importance for the even distribution of power. Two frames are raised in the centre of each section at a point from whence the driving power is to be taken; these frames consist of four cast-iron columns joined together at the top and bottom by strongly made cast-iron transoms. The shafting is supported on each side by a double line of similar columns. There are five groups of boilers placed outside and along the French machinery hall, and the necessary steam will be supplied to sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11. The necessary pipes for conducting the steam to the machinery are placed in a transverse underground gallery running between the corresponding sections; at such points the pipes are divided into branches, each of which is laid in a longitudinal gallery under the level of the floor. A circular sewer, 18 in. in diameter, is constructed under this longitudinal gallery for the purpose of carrying off the condensed water from the engines. There are six ventilating drains running transversely to this sewer, and passing through the foundation of the machinery hall. The foreign machinery hall is divided into 11 sections, 5 of which receive machinery in motion. England has 2, Belgium and Switzerland 1, the United States and Sweden 1, and Austria and Hungary 1. These four corresponding sets of boilers on the outside, and the transmission of power is arranged in the same way as in the French section. The machinery in sections 1 and 2 belonging to England is driven by a steam-engine 250-horse power, placed at the entrance of section 2, and the power is communicated underground by a shaft 5 in. in diameter. The power is then communicated directly by belting to shafting overhead. The transmission framing in the English section 1 is also arranged in a similar manner to that of the French section 1. That of the English section 2 is slightly modified. There is no difference whatever between the arrangement for the transmission of power in the section allotted to the United States and Sweden, and that of the French section.

England and her colonies have been allowed to take precedence among foreign exhibitors. The space allotted to the English consists of one-half of the grand vestibule opposite to the Seine, the western angle pavilion, and also a length of about 650 ft. in the Foreign Industrial Hall and Machinery Galleries. She also possesses in the Fine Art Gallery a hall 111 ft. in length by 82 ft. wide, and also two smaller rooms adjoining, and opposite to the Avenue of International Architecture, as well as space for the erection of five façades, the architecture of which is of a typical character. England has also special annexes for agricultural and mixed machinery in a portion of the ground of the Champ de Mars, the lengths of which are 262 ft. and 524 ft., and 65 ft. wide; two smaller pavilions and a boiler-house complete the available space. The British Commission offices are situate adjacent to the British space and in the Avenue de Suffren. One of the lateral entrances to the Exhibition, called the Porte Desaix, is immediately opposite to the principal offices, which are situated in the house of M. M. Fland, a firm of French engineers. The offices of the several colonial governments are situated at the angle of the Rue Desaix. Every facility is thus offered for the harmonious working of the colonial and British officials. The offices of the United States section is in the same building. A large house, called the Mechanics' Hall, is also situated in the Rue Desaix adjoining the offices above referred to, which at the instigation of the Royal Commission has been fitted up for the use of the workmen attached to the British section. In the Rue Kleber, and near to the Mechanics' Hall, is another building belonging to the British Commission, and employed for the use of the sappers commanded by the Commission. The French Commission furnished a very ornamental design for the English boiler-house and chimney shaft, which erections have been strictly carried out according to the plans. Messrs. Galloway and Sons, the eminent boiler engineers, have erected three steel boilers in this house. Instead of erecting one façade on the ground occupied by the British section, five independent buildings have been built up, the façade of each representing characteristic and typical architecture. Mr. Norman Shaw, R.A., has supplied the design for the first of these buildings, which is of Queen Ann's style, and has been built by Mr. W. H. Lascelles; this house has been furnished by Messrs. Jackson and Graham, and is at the disposal of the President of the Royal Commission.

The Prince of Wales' pavilion was designed by Mr. Gilbert Redgrave, and is in the Elizabethan style; it is the second building of the series, and has a length of about 82 ft. The antichamber or hall is gained through a large central doorway; from this chamber entrance is obtained to all the other offices. The dining-room is 31 ft. long by 21 ft. wide; a large flat skylight, filled with glass rich in decoration, lights this room, which is the pavilion itself, and no pains or expense have been spared in fitting it up. There are also other rooms beautifully fitted up and ornamented for the use of H.R.H. the Prince of Wales. The third building has some pretensions to Gothic, but those previously described throw it completely in the shade. Mr. G. Redgrave has designed the façade of the fourth building, and it has been erected by Messrs. Cubitt and Co.; it has very distinct features, and, as a whole, the structure is very remarkable; this house is occupied as offices by the Commission for Canada. The fifth house has a façade in the Anglo-Dutch style; it was designed by Mr. Collett. There is an ornamental garden between each of these façades.

Canada and Australia occupy the Western Pavilion close to the vestibule. One of the most remarkable objects in this section is the Canadian trophy, 100 ft. in height, constructed of wood brought from that colony; it has great architectural beauty, and its three stories are accessible by a spiral staircase; on each side of it will be displayed manufactured products, as well as mineral, vegetable, and animal objects of great interest. This trophy will be flanked by four smaller trophies consisting of mineral substances. Mr. Scott, the architect attached to the Canadian Commission, designed this rich architectural trophy, and it certainly reflects great credit on his artistic talents. The four corners of the pavilion are set apart for the Australian colonies—i.e., New South Wales, Victoria, South Australia, and Queensland. These corners were intended to be occupied by four gilt-gold pyramids representing the amount of gold obtained by certain companies from the colonies. There are, however, only two such pyramids, and two large cubical masses in place of the other two.

There has been considerable progress made within the last nine days towards the completion of some of the sections. The most marked alteration has taken place in the French machinery department; the end adjacent to La Porte Tournville is, however, far from completion. The Austrian, Italian, and Russian departments are also very backward. Great difficulty is experienced in identifying many exhibits consequent upon the confusion in which they are found, and from the fact of their not yet having any numbers painted upon them. Little more, therefore, can be done at present than to give a general reference to the situation of the exhibits, reserving, as we are compelled to do, a more particular and detailed description until the whole collection presents a more favourable appearance. We have seen nothing whatever to justify us in arriving at a different conclusion to that formerly expressed—i.e., that the Great World's show has been opened one year too soon. It will be some considerable time before the whole of the works connected with the Exhibition can be in a fit condition to receive a large number of visitors crowding into Paris from all parts of the world. Workmen are still employed at the Palace of the Trocadéro night and day, and on a part of the façade on the building of the Champ de Mars. The scaffolding presents anything but an agreeable appearance to visitors who are constantly being annoyed and interrupted by the workmen and their operations in many parts of the pleasure grounds. When wind exists the waters of the grand cascade not only scatters a heavy shower of spray along the pathways, rendering them nearly impassable, but also over those who may be happening to pass along.

Trocadero ground is certainly the most backward portion of the exhibition, loose gravel and dust existing where it is intended turf should be.

GEOLOGICAL SOCIETY OF LONDON.

May 8.—HENRY CLIFTON SORBY, F.R.S. (President), in the chair. Charles Preller Sheibner, Ph.D. (Leipzig), A.I.C.E., Charles-street, Grosvenor-square, was elected a Fellow of the Society.—William Crisp, Clarges-street; Dr. J. D. Gordon, George-street, Portman-square; and Joseph Richard Haines, Adderley Green Collieries, Stoke-on-Trent, were proposed as Fellows of the Society.—John Collins, Bolton-le-Moors, will be balloted for as a Fellow of the Society.—The following communications were read:—

- 1.—"On the Glacial Phenomena of the Long Island, or Outer Hebrides" (second paper), by James Geikie, LL.D., F.R.S., F.G.S.
 - 2.—"On Cataclysmic Theories of Geological Climate," by James Geikie, LL.D., F.R.S.; communicated by Prof. A. C. Ramsay, LL.D., F.R.S., F.G.S.
 - 3.—"On the Distribution of Ice during the Glacial Period," by F. Jamieson, F.G.S.
- At the next meeting of the Society the following communications will be read:—1. "On the Serpentine and Associated Rocks of the Yorkshire Coast," by Prof. T. G. Bonney, M.A., F.G.S.—2. "On the metamorphic and succeeding Rocks in the neighbourhood of Loch Maree," by Dr. Henry Hicks, F.G.S.—3. "A microscopic study of some Huronian Clay-slates," by Dr. A. Wichmann; communicated to the President.—4. "On Foyaité, an Elaeolitic Syenite occurring in Portugal," by C. P. Sheibner, Ph.D., F.G.S.—5. "On the Triassic rocks of Normandy and their environments," by W. A. E. Ussher, F.G.S.

SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE INSTITUTE OF MINING ENGINEERS.

The first excursion in connection with the Institute took place on Monday, the localities being Perry and Hamstead, where extensive workings in search of coal are proceeding. Some 50 members started from Dudley in brakes; 10 members joined at West Bromwich, and some 20 others on the road. The sinking at Perry was first visited, and the fine plant minutely examined. The boilers, the engines, and the arrangements all came in for a share of praise.

Mr. HENRY BAILEY read a short paper on the Working of the Diamond Rock-drill. He said the engine was a portable one, fixed on a multitubular boiler, with 10 in. cylinder, 18 in. stroke, and working at a pressure of 50 lbs. The pumps of the boring apparatus could be worked with this, either singly or together. The "quill" was driven by the spin gearing at the rate of 80 to 150 revolutions. The boring rods are tubing passed through the quill into the bore-hole; a hose is attached to the top of the rods, and connected with the pumps, by which the water was forced through both hose and rods at a considerable pressure to the bottom of the hole, where the core tube, 30 ft. long, had attached to it the "crown" studded with diamonds, upon the bottom rim of which they are embedded, so as to cut their way through the hardest rocks. The diamonds are not brilliant, but black diamonds from Brazil, and twice as hard as quartz, and cut their way by abrasion, and not concussion. In doing this a core is formed, and if the strata will stand inside the tube it is brought to the surface; but all soft material is worked up outside the rods to the surface by the great pressure of water pumped down the inside. The continual stream of water answered two purposes:—(1) keeping the core tube cool, and (2) lubricating the whole length of rods by clearing the hole. The shaft is 400 ft. deep, and 7 in. lining tubes are fixed from the surface to the bottom. The boring was commenced on Dec. 14, and the shaft was carried to a depth of about 270 ft. with a 6 in. crown, and to a further depth of 680 ft. with 5 in. tubes. The boring is now proceeding with a 4 in. crown, and a total depth of 1430 ft. had been reached. The average boring is 7 ft. in 24 hours. Mr. Bailey then showed the company specimens of strata passed through, and a section of sinking. These attracted considerable attention. Mr. Jonah Davies exhibited the pumping engines and other machinery on the surface, all of which is placed under his superintendence. The pumping engine is a splendid piece of work, with a 33 in. cylinder, and 5 ft. stroke. Before passing from the engine-house the President (Mr. W. North) said he thought they would agree with him that their thanks were due to the Perry Colliery Company and to Messrs. Bailey and Davies for their descriptions of the boring, engines, &c. He had great pleasure in proposing that the thanks of the Institute be given to them for their kindness and courtesy.—Mr. W. B. Collis in seconding the proposition, said he hoped the name of the Perry Colliery Company would be fully realised. He hoped their enterprise would become a success. It was a most spirited undertaking, and he hoped their patience and faith would be amply rewarded. The vote of thanks was carried by acclamation. Mr. Joseph Bailey, on behalf of the company, said he was glad to see the Institute that day, and he hoped the time would come when they should be able to show them the coal, for at present there were signs of their hopes being realised.

The company afterwards visited the Hamstead Colliery Company's sinking, and the works were explained by Mr. E. Smallman, Mr. Meacham, and his son. In the brickshed belonging to the company the directors entertained the Institute at dinner, after which the President moved a vote of thanks to the company for the opportunity of inspecting the fine sinking, and for the hospitality extended to the Institute.—Mr. Thos. Parton, F.G.S., Mr. Cooksey, Mr. Lindop, Mr. John Hughes, and Mr. Collis supported the motion, which was carried unanimously. Mr. Groucutt, for the directors, responded, and the company returned home. Mr. Alexander Smith, C.E., the secretary, conducted the arrangements to a successful issue.

—*Waterhampton Chronicle.*

FOREIGN IRON AND STEEL INDUSTRIES.

The exhaustive and interesting report on the Progress of the Iron and Steel Industries of Foreign Countries for the second part of 1877, prepared by Mr. JULIEN DEBY, the foreign secretary of the Iron and Steel Institute, has just been issued by Messrs. M. and M. W. Lambert, of Newcastle-on-Tyne, and fills a closely printed volume of nearly 250 pages. The systematic arrangement which Mr. Deby has adopted in the present volume adds much to its value. The general division into countries—America, Austro-Hungary, Belgium, Canada, France, Germany, Greece, Italy, Russia, Spain, and Sweden—is rendered very easy of reference by the adoption of the alphabetical order, whilst the subdivision of each into technology, statistics, and the iron trade much facilitates comparison. Mr. Deby pays high compliments to several of the American technical periodicals, and borrows largely from their pages, and also supplies abstracts of many valuable papers bearing on the iron trade. The fact of the manufacture of "American Scotch" pig sufficiently indicates one branch in which the Americans are seeking to render themselves independent of outsiders. For more than three years one of the Cherry Valley furnaces at Leetonia, Ohio, has been making this grade of iron. The ores used are native black band and shell. With the pure coke employed it is claimed they make a purer iron than the Scotch and stronger. The chief characteristics of the Scotch iron are softness, fluidity, and cleanness, and while it is neutral it has all the strength of red-short iron. The American is stated to have all these points, and to carry as much scrap as the imported Scotch, and mixes well with other irons.

From the above it is obvious that sufficient competition exists in America to induce the Scotch makers who desire to retain a position in the United States to look well to quality, and the Notes on Foreign Forgings at the Centennial Exhibition, by Mr. W. F. Durfee, a member of the Board of Judges, are certainly not very complimentary to this country, for he says—"Among the nations Great Britain is distinctly the land of the mine and the forge, and we had a right to expect from the native country of Cort, Dudley, Watt, Neilson, Nasmyth, Mushet, Bessemer, Bell, and many others known to fame, something which while illustrating the magnitude of her furnaces and forges, would at the same time serve as an instructive example of the kind of work that we at no distant day must produce. But this natural expectation from a land that has invented every-

thing, that makes great things in smithwork possible, was not realised by the presence of any notable product of her forges, and it is to other nations formerly apprentices to England that we have to look for everything really instructive in the art of forging the Exhibition contained."

With regard to the Danks process Mr. John T. Williams, superintendent of Messrs. Graft, Bennett, and Co's. Mill Vale Mills, near Pittsburgh, has furnished some interesting details. He states that as a worker of metals the furnace has no equal, as a melter it is inferior to many, and as to endurance it was the shortest lived of any, and as to convenience of repairs, it was one of the most difficult. As to quality of iron produced, it has reached a place so far above all others that it stands pre-eminent.

The Belgian technological section contains much interesting information, one statement explaining the cause of the cheapness of Belgian iron. They have—"1. Cheaper and steadier labour, with 12-hour shifts.—2. Gas firing instead of the direct combustion of coal, by which 20 to 25 per cent. economy in fuel is realised.—3. Three-high mills for all kinds of iron; saving time, labour, waste, and reheating.—4. The native pig employed allows the puddler making four heats more in 24 hours than can be done with ordinary Cleveland pig." British workmen will learn what sort of competition has to be met by the statement that a Belgian labourer works from Monday morning at six o'clock until Saturday night at twelve without intermission, and lives on food on which a British labourer would starve. His physical powers are at least one-third less than those of the Englishmen, by which we mean that in a Belgian ironworks the production of a certain tonnage of mill iron will generally be found to employ about one-third more labour than would be required in England. Good puddled and rolled iron is produced at 73s. per ton. The waste in well-conducted works is from 20 to 22 per cent., which includes both the loss in the furnace and the waste in the rolling, so that in order to obtain 1000 net kilos. ready for shipment, 1200 to 1220 kilos. are required to start with. The steam-hammer man receives 4 francs per day, and the average salaries through the works do not exceed 3 to 3½ francs. The puddler, who pays his own help, receives about 8s. 3d. per ton of puddled bar. The metallurgy of iron and steel in France has been far from prosperous during the year 1877. Internal political struggles of long duration, along with the fear of Oriental complications in more recent times, has had a depressing effect on the trade in general, and complaints have been heard from most of the metallurgical centres. The great pre-occupation of the French ironmasters has been for some months the tariff question, and the best means to be adopted for preventing the Government from diminishing the duties on foreign iron and steel in the new treaties now being elaborated. The protective feeling among French ironmasters is general, and of the most uncompromising character. This is readily understood in a producing country such as France, whose exports are, and must remain, comparatively insignificant, but where on the other side certain home monopolies allow them to ply more or less successfully their avocations without the necessity of finding customers beyond the limits of their frontiers.

With regard to Greece, it appears that since 1865 no less than 30 concessions have been granted for iron mines, and 101 for chrome iron ores. As no coal exists in Greece, and charcoal is exceedingly scarce, the only ores which would pay for working have to be of very remarkable purity and high percentage. The old mines of Seriphos, containing rich brown ores, magnetites, and spathic ores, have been worked experimentally during these latter years. The Greek Metallurgical Company began operations here in hopes of being able to smelt the iron at Kumi (Euboia) with native lignites. This proved a comparative failure, and it was then sought to export the ores, and by the end of 1874 there had been shipped to the Royal Greek Ironworks, at Wallend, near Newcastle, 37,500 tons, the first 10,500 tons fetching 5s. and the remainder 8s. per ton. The analyses showed that the rich brown ore contained 53 to 58 per cent. of iron, and 0.3 to 0.9 per cent. of manganese, while the red ores contained 42 to 46 per cent. of iron, and from 2 to 7 per cent. of manganese. The proportion of silica, alumina, and lime in these ores is very variable. The grey pig-iron made with these Grecian ores, and which was intended for Bessemer purposes, contained 0.05 to 0.08 of phosphorus, and it was stated that the white pig made from it did not contain any larger proportion of phosphorus. If a revival of trade were to take place these Grecian deposits will, no doubt, deserve the attention of British producers of Bessemer pig. The information with reference to Russia is chiefly derived from British periodicals, and the details as to Sweden are furnished by Professor Richard Akerman.

The volume is altogether a most interesting one, and reflects great credit upon Mr. Deby, not only for the admirable selection, but for the excellence of the English in which it is written. It is but rarely that the foreign origin is discernible, and even then the statements are thoroughly intelligible. The Institute may well be congratulated upon having so competent and energetic a foreign secretary.

TESTING AND WORKING SILVER ORES.

In connection with the development of mines in districts not in the immediate vicinity of machine factories, it has frequently been remarked that commercial success or failure depends in a great measure upon the ability of those entrusted with the management, and that it is really surprising to observe how much the practical man will do with inexpensive apparatus and machinery producible on the spot, whilst the theoretical manager will place the concern on the road to ruin by waiting for machinery obtainable only after long delays, during which the fixed charges necessarily going on are eating up the working capital, and at a great distance from the mines. But, inasmuch as even among practical men it is found that some are much more ready than others in determining how to adapt themselves to the circumstances of the moment, and utilising the resources within their reach, such treatises as that of Mr. Charles H. Aaron are particularly valuable. With regard to Mr. Aaron's competency for the task he has undertaken there can be no doubt, as his name was previously well known as the author of several sound, practical memoirs.

In 1869 he described a mode of treating certain refractory silver ores without roasting, so as to make them yield 90 per cent. of the assay, and this has since been tested on the large scale with excellent results. He now treats of silver mining generally, and writes so as to be understood by common miners and prospectors. He remarks that in all silver regions there is found more or less silver ore in the form of small veins or threads, as the Mexicans say, or in bunches, pockets, and deposits of little extent, which, while they will not justify the attention of capitalists, might yet furnish profitable occupation to a number of miners if the owners only had sufficient knowledge to extract silver in a cheap and simple way.

In the mineral districts of Mexico nearly every miner has some knowledge, however rude, of metallurgical operations, which enables him to work in one way or another any small rich lode which he may discover, and though in large operations the Mexican may not be able to compete with more enterprising people yet it is a fact that among miners and prospectors a Mexican will make a good living where an American would starve to death. Though he writes mainly for the benefit of the poor and unlearned class in the American mining districts it is not to be supposed that his methods are not adapted to large operations; on the contrary, he maintains that if his modification of the old formula of Alonso Barba had been adopted for the Comstock Mine long ago many millions of dollars which are now locked in the Carson river might be in the pockets of stockholders, and the value of stocks would be proportionally higher. The whole of his directions are concise and clear. The prospector, having found a sample that looks promising, is directed to grind a few ounces of the ore to powder between two rocks, and to it about one-tenth as much salt, and about half that quantity of sulphate of iron, which is often called copperas, then mix them all together, and after that is done put it into an old shovel or frying pan, which should have been previously smeared with clay or mud, and dried, then roast it over a fire, being careful to stir it often with a piece of stout iron wire. Let the roasting proceed quite gently as long as the smell of burning sulphur can be perceived, not allowing the heat to exceed a dark red, as seen at night. When the fumes of sulphur cease let the heat increase to a rather light red, but not so as to melt the ore, stirring it still with the wire. The smell will now be that of chlorides, rather pungent, often sweet, as of new hay, but very easily distinguished from that of sulphur. The ore will swell and appear woolly, and somewhat sticky, and a few minutes of this hotter roasting will finish another any small rich lode which he may discover, and though in large operations the Mexican may not be able to compete with more enterprising people yet it is a fact that among miners and prospectors a Mexican will make a good living where an American would starve to death. Though he writes mainly for the benefit of the poor and unlearned class in the American mining districts it is not to be supposed that his methods are not adapted to large operations; on the contrary, he maintains that if his modification of the old formula of Alonso Barba had been adopted for the Comstock Mine long ago many millions of dollars which are now locked in the Carson river might be in the pockets of stockholders, and the value of stocks would be proportionally higher. The whole of his directions are concise and clear. The prospector, having found a sample that looks promising, is directed to grind a few ounces of the ore to powder between two rocks, and to it about one-tenth as much salt, and about half that quantity of sulphate of iron, which is often called copperas, then mix them all together, and after that is done put it into an old shovel or frying pan, which should have been previously smeared with clay or mud, and dried, then roast it over a fire, being careful to stir it often with a piece of stout iron wire. Let the roasting proceed quite gently as long as the smell of burning sulphur can be perceived, not allowing the heat to exceed a dark red, as seen at night. When the fumes of sulphur cease let the heat increase to a rather light red, but not so as to melt the ore, stirring it still with the wire. The smell will now be that of chlorides, rather pungent, often sweet, as of new hay, but very easily distinguished from that of sulphur. The ore will swell and appear woolly, and somewhat sticky, and a few minutes of this hotter roasting will finish

Mr. Aaron naturally seeks to reduce his testing apparatus to the simplest form, and hence he only proposes to employ for the tests just mentioned salt, sulphate of iron, an old shovel or frying pan, a piece of stout iron wire, and a strip of sheet

copper 6 in. long; whilst for another test he only requires salt, bluestone, a strip of paper, and a teacup or a basin, which can be set in the top of an empty oyster can. He has never found these tests fail to determine whether the ore is valuable or otherwise. The next step is of course to determine what process will be most advantageous to treat it by, for, as Mr. Aaron remarks, although very rich ore will bear transportation to a market, yet the losses, expenses, and discounts which are inseparable from this way of disposing of it have caused miners in general to entertain a strong and not unfounded objection to selling their ores, especially when the market is very distant; and he explains that whether the mill is to be large or small it is equally necessary to find out before building it whether the ore can be worked raw, or must be roasted or smelted. Mr. Aaron next describes his process for working ores, and he remarks that his first operation was conducted on about a grain of ore in a minute porcelain cup, with the aid of a copper belt rivet, the next was on 5 lbs. of ore in a kettle, then on 1 ton in a wooden barrel, and subsequently thousands of tons have been worked by it, and near \$1,000,000 extracted. The method of working roasted ores, the leaching processes, and smelting, are then referred to, and he observes that when a Mexican finds rich ore, and can get galena in the vicinity, he puts up a little furnace of adobe, smelts out his silver-lead, refines it in another furnace, and buys beans with the proceeds. Why, asks Mr. Aaron, cannot intelligent Americans, who have opportunities of seeing smelting carried on, go and do likewise? In course of time the knowledge would spread, and many honest miners might profit by their discoveries, instead of waiting for capital, or abandoning their mines because they cannot sell them. Kroenke's process, in use at Copiapo, Chili, is next described, and he points out the advantages of light stamps over heavy ones, and speaks highly of Crocker's trip-hammer battery, which is claimed to crush 5 cwt. per hour with 1-horse power. Paul's pulverising barrel, Kendall's battery, Nolce's pulveriser, are fully described; and, referring to amalgamators, he says that the man who, though poor in pocket, has rich ore need not despair of getting along if he has energy and some ingenuity. A 5-gallon beer barrel will make an admirable amalgamator for 50 lbs. of ore, which if worth \$500 per ton will yield as much money as 1 ton of Comstock ore at \$12 50, the barrel being mounted, and turned "by hand or foot, dog, squaw, Chinaman, horse, water, or steam power," whilst a wash-tub will serve for a separator. Aaron's amalgamator, improved separators, retorts, &c., are in a rough and ready apparatus of ample efficiency for the practical miner's purpose. The book, taken as a whole, contains so large an amount of information, and occupies so small a space that it should find a place in the travelling bag of every prospector and mine manager proceeding to districts where City libraries are inaccessible. Not only will it enable the practical miner to rely much more fully upon himself when visiting distant countries, but it will prevent him from passing valuable ore deposits which might otherwise escape his notice, as well as from encumbering himself with specimens which contain nothing of commercial utility. The volume will doubtless be widely circulated.

"UNDER THE RED ENSIGN."

There are probably few who have worked harder to improve the condition of those who choose a sea-life, and the merchant service, than Mr. THOMAS GRAY, of the Board of Trade, and his "Under the Red Ensign," now issued (London: Simpkin, Marshall, and Co.) is likely to prove not less useful in facilitating the accomplishment of the same object. Mr. Gray does not advocate the sea as a profession for boys, but he affords such information as will assist parents and guardians in giving a fair start to such of those entrusted to their care as determine to become sailors, and assist boys in coming to some rational conclusion as to whether the sea life is likely to suit them. He also makes a suggestion which is worthy the adoption of others—that a training ship, on board of which lads could be sent by parents and guardians who could pay from 15s. to 20s. a year for their boys is very much wanted, and that if it were started it would, besides being a very good thing in many other ways, be without doubt a commercial success. Mr. Gray says that boys sometimes say they would like to go to sea, and say so without any settled wish or determination for the sea, but to keep them at school, and set them to a good trade. He recommends a good trade before a clerkship, as clerks are already a drug in the market, and a great body of them in time, and that not very distant, will not be worth the ready apparatus of ample efficiency for the practical miner's purpose. The book, taken as a whole, contains so large an amount of information, and occupies so small a space that it should find a place in the travelling bag of every prospector and mine manager proceeding to districts where City libraries are inaccessible. Not only will it enable the practical miner to rely much more fully upon himself when visiting distant countries, but it will prevent him from passing valuable ore deposits which might otherwise escape his notice, as well as from encumbering himself with specimens which contain nothing of commercial utility. The volume will doubtless be widely circulated.

All classes—rough boys, apprentices, and middies—are dealt with by Mr. Gray, who remarks that a light shipboard life is of no use as a rough boy at sea, but pluck, size and weight are very valuable. If the boy is to be bound apprenticeship size is not so much importance. One thing which, he says, often deters parents and guardians from letting boys go to sea is the ignorant and mistaken idea that the sea service is a hard service, and many a boy who ought to have been at sea has been kept at home solely because the fond parent has exaggerated the hardships of sea life. The dangers of a sea life, too, are grossly exaggerated and misrepresented. Undoubtedly there are shipwrecks and sufferings at sea, but a passenger steamship is as safe as a passenger train, and as a matter of danger it is quite as safe, if not more so, as a sailing ship. You may depend upon it that boys will do no good and may do a deal of harm ashore, therefore let him go to sea; treat him as a reasonable and intelligent lad with high spirits and a will of his own, and help him properly. There is no time in the life of a spirited boy when the exercise of judicious kindness will bear such good fruit as when he is about to go to sea.

But the great majority of boys wanted at sea are known as "rough boys," who if they chose to remain ashore would become good citizens of the labouring classes. These boys when they go to sea need not go as apprentices. In what is now called the "black trade" it is the fashion to bind boys as apprentices. That system is fast dying out in nearly all trades, and in no trade so much as in that of seamen. The boy now generally goes to sea as a "boy" or as an ordinary "seaman," with wages from the first; but boys who attempt to do this ought to be well grown, and able to take their own part. There are some shipowners large hearted enough to take apprentices without a premium, but as a rule a premium is required. In the first place it makes a boy think something of himself, and this alone is a great point gained. So long as a boy has a good opinion of himself he is more likely to keep straight. Parents and guardians may take it as a fact that boys who go to sea and get good wages, or as rough boys, at once will, as a rule, remain as seamen all their lives, whilst those who go as apprentices will become officers if they stick to their ship and turn out to be faithful and good servants. Owners are now as much, if not more than ever they were, glad to get a good officer as a good officer is to get a good ship, hence the well known saying, "First get the captain, then get the ship."

The first thing to avoid is the advertising crimp; these people live on the widow and the anxious guardian. Mr. Gray points out that advertisements offering to get employment for boys on board ship are frequently swindles, but if anyone be deceived by them they deserve no pity, as the Board of Trade offers them protection free of any charge whatever. Mr. Gray advises the parent or guardian to cut out the advertisement, and send it to the Assistant-Secretary, Marine Department, Board of Trade, London, "with an enquiry whether the advertiser is known, and whether he is licensed by the Board of Trade to supply seamen and apprentices to ships. There is no harm in making the enquiry, and it may save money. Some of these men have been convicted more than once, and such of them as sail pretty close to the law are pretty well known at head-quarters, and the enquiry addressed as above will be answered at once. Mr. Gray also gives the sections of the Act, which parents and guardians should study if they wish to avoid being defrauded, and explains the manner in which the crimps get their money. He adds that his readers ought to know that the Board of Trade are public prosecutors, and prosecute to conviction (free of expense to the parent or guardian, or seaman or apprentice who has been imposed on) any person who contravenes these sections. Anyone who has been or may be hereafter imposed on should at once address particulars to the Assistant-Secretary as mentioned. There are (Government) Mercantile Marine Offices at every port; all are cautioned against having to do with any person offering assistance unless he has "B. (Crown) T." on his cap. It is not difficult to secure the apprenticeship of a boy without paying any premium, and he will receive as wages about 24s. to 26s. during his four years' term. The first thing to determine is whether the boy is to be apprenticed or not. If he is a big boy of suitable age, and has no great chance of developing into an officer, he is better off as a boy, and should get 10s. per month wages at once. After making a voyage on a sailing ship—say to India, China, West Coast of America, or the Australian Colonies—he can, without the assistance of a crimp or of anyone, engage himself as an ordinary seaman at 25s. to 35s. per month; after the second voyage as a first-class ordinary at 40s. to 50s., and after the third voyage as A.B. at 60s. to 70s. By this time he will have served about 44 months at sea, and he will have earned altogether about 75l. free of board and lodging. The "kit" for an apprentice can be obtained of Hallett, of Ratcliff Cross, for 3l. 15s. 1d.; yet Mr. Gray knows of more than one striving widow who has been driven to incur four times the expense, because of the extra profit it has given to the advertising crimp and sloop-seller.

But these valuable little pieces of information might be extracted from Mr. Gray's book to almost any extent, but enough has been done to show that the author is thoroughly master of his subject (indeed, his position at the Board of Trade would be a sufficient guarantee of this), and has been very successful in compressing an enormous number of facts into a very small compass. Mr. Gray's object has been to keep boys who go to sea out of the hands of the crimps, and there cannot be the slightest question that by following the advice which he has given in the book many a sum of hard earned money will be saved, and the crimp will be unnecessary and demoralising support. The manner in which Mr. Gray has performed his task will certainly give satisfaction to the public, and he has certainly entitled himself to the thanks of all connected with the Board of Trade for having directed such prominent attention to one of the matters in which his department renders such important service to the country. The Board of Trade spends a large sum of money in advertising and prosecuting crimps, and the publication of this book as "Under the Red Ensign" cannot fail to render the execution of the department even more efficient than hitherto by helping to command the assistance of all who have hitherto suffered from the Board of Trade regulations having been ignored.

MARINE ENGINEERING NEWS.

The second volume of the ably conducted monthly bearing this title has just been issued, and for those connected with marine engineering the information given is likely to prove highly valuable. For example, the Board of Trade regulations relating to the strength and working pressure of boilers are given, and there are careful abstracts of papers bearing on marine engineering read before scientific and technical societies—one on Douglas's patent davits and

boat-lowering apparatus being given in the first number, which will prove of great practical use, and forms a fair sample of those published from month to month. The full page engravings of slide valves, furnace grates, and so forth will afford some useful hints to those engaged in the construction of marine engines. Reports of important Admiralty decisions will assist the readers in avoiding falling into errors themselves, and the answer to questions set at the pass-examination will greatly assist candidates in pursuing their studies. The Marine Engineering News is altogether a useful little work, and well deserving of wide patronage both ashore and afloat.

LOCAL TAXATION, AND THE RATING OF MACHINERY.—Mr. T. F. HEDLEY, of Sunderland and Birmingham, has just issued (London: Knight and Co., Fleet-street) a handsome volume giving a report on the rating of machinery, with all the decided cases thereon, including the shorthand writers' notes of the special cases, arguments, and judgment in *Lalig v. the Overseers of Bishopwearmouth*. There can be no doubt that the law on the subject is in a most unsatisfactory condition, and frequently presses hard and unjustly upon the user of machinery, but Mr. Hedley's volume will do much to facilitate a proper comprehension of the matter, and to avoid disputes in future.

GOVERNMENT INSPECTION OF MINES.

MR. DICKINSON'S REPORT.

Mr. Dickinson mentions that he has previously shrunk from specifying even in outline the duties which he has performed, but in obedience to the Home Secretary's direction of Dec. 10 he gives particulars which might otherwise have appeared a parade. As to the inspection he shows that official duties during the year 1877 occupied 318 days and 3 nights; and they occupied the assistant inspector 302 days and 6 nights. They made between them 533 visits of inspection to mines. Of these 195 were underground, as well as to the aboveground works; the others being to the aboveground works, including inspections of machinery, fittings, report books, publication of official abstracts, rules, and notices; also the plans, and making enquiries as to the restrictions on the employment of women and young persons, &c. Of the 533 visits 374 (of which 147 were underground) were made by the assistant inspector, the remainder being by Mr. Dickinson. The inquiries or adjournments attended by them were 61, of these 370 were by Mr. Dickinson. The prosecutions for breaches of the Acts, instituted with sanction, were 26. The penalties imposed thereon were 711. 7s. 6d., besides costs. The distance travelled by him on official duties, as near as can be ascertained, was 15,695 miles, of which 13,640 were by rail and steamship, and 2055 by other conveyance. The distance travelled by the assistant inspector was 11,150 miles, of which 5732 were by rail and steamship, and 5418 by other conveyance.

Mr. Dickinson's personal attention was given to each of the prosecutions, both in the preparation of the cases with solicitors, and at the court. The principal portion of the correspondence and the other office and general duties devolve upon Mr. Dickinson, and the whole of the correspondence passes through his hands, the assistant helping so far as possible. The assistant has, therefore, more time for visiting mines. It will, as is pointed out, be understood that some visits and attendances are long and arduous, whilst others are short and easily made. Mere visits and miles travelled form, therefore, only elements in the count of work done, whether it be in the same or any other district. Indeed, it would be productive of misleadings were mere visits and miles made by him, and in a similarly guarded manner as he expects his assistant also, since he has had one. In fact, of the 26 prosecutions instituted by him last year 20 of them were where no accident had happened, and in addition to such visits by himself, 214 of the visits by the assistant were without having any accident to investigate.

In what may be called the technical portion of the report Mr. Dickinson states that at the Alderley Edge Copper Mine, where 22 persons are employed underground, and 13 aboveground, there was a boiler explosion occasioning slight personal injury, but there was a great destruction of property. At the rock salt mines of Northwich and Winsford, 311 persons were employed, and in a similarly guarded manner as he expects his assistant also, since he has had one. In fact, of the 26 prosecutions instituted by him last year 20 of them were where no accident had happened, and in addition to such visits by himself, 214 of the visits by the assistant were without having any accident to investigate.

With regard to Ireland the annual returns made to Mr. Dickinson under the Coal and Metalliferous Mines Acts show that in Ireland in 1877 38 collieries and 41 metalliferous mines were at work. The number of persons ordinarily employed in and about the collieries was 1248, and in and about the metalliferous mines was 2045. Of the persons employed at the collieries 78 were in the province of Connaught, 713 in Leinster, 277 in Munster, and 180 in Ulster. Of those at the metalliferous mines, 13 were in Connaught, 84 in Leinster, 910 in Munster, and 633 in Ulster. The totals as compared with those of the preceding year, are a diminution of 117 persons at the collieries, and 283 in the metalliferous mines. The diminution at the collieries is 21 in Connaught, 85 in Leinster, 8 in Munster, and 2 in Ulster. The diminution at the metalliferous mines arises from the general depression. In the price of copper ore, owing to foreign competition. In Connaught 6 more persons were employed than in the previous year, and 67 in Leinster, 54 less, and in Munster 302 less. Of the 1248 persons employed at the collieries 883 were belowground, and 365 aboveground. The produce of coal during 1877 was 140,181 tons, which is an increase of 14,986 tons as compared with the preceding year. Connaught produced 6477 tons; Leinster, 88,995; Munster, 30,211; and Ulster, 18,398. The increase is 1774 tons in Connaught, 15,070 in Leinster, and 63 in Ulster, Munster being a decrease of 8421 tons. Ulster also produced 2040 tons of fire-clay, exclusive of what was produced by openwork. The average get per person employed in and about the coal and clay mines is 113 tons, which is an increase of 20 tons per person as compared with the preceding year. The get per person, however, is only a little more than one third as compared with the Lancashire portion of the district; the average in Lancashire, where the collieries are larger and the seams thicker, being 301 tons per person in 1877. The mines of Ireland in proportion to the number of persons employed now constitute about one-tenth part of the district with which they are associated. The Irish portion of the district was visited on a separate occasion, which occupied 83 days. Of these visits 8, occupying 44 days, were made by him, and the rest by the assistant inspector; 92 visits of inspection were made to mines, exclusive of enquiries at mining offices. Of these visits 26 were underground, as well as to the aboveground works; 22 were made by him, 6 of them being underground as well as aboveground. The others were by the assistant inspector.

MR. WYNNE'S REPORT.

It is much to be regretted, Mr. Wynne states, that colliers do not turn to better account the powers given them by the 30th clause of the Coal Mines Regulation Act, and report anything they may find that in their opinion may lead to danger, and had his advice been taken at the passing of the Act the men would have been allowed 5s. a day once a month for doing the work, and then all excuse for neglecting so important a duty taken away. No one can have lived 40 years amongst colliers without remarking the extraordinary changes that have taken place in their habits, their feelings, and their course of conduct; formerly they worked hard, too hard; they had confidence in their employers, which was sometimes betrayed; and their great object seemed to be to keep the wolf from the door, and leave their family in a better state than they themselves were at starting; but now everyone wants to live without work, and seems to think that the life of an agitator is the pleasantest of all pursuits, and that confidence must not be placed in employers any longer. Now it will be found that when capital becomes "divorced" from labour capital can support a wife and family for a long time; but what can labour do but go to the Union and thus destroy that noble spirit of an Englishman that claimed honest industry as a birthright.

During this long period of depression in the iron and coal trade it has become the fashion to attribute all the ills that now press so heavily on those trades to the working of the Mines Regulation Act, and all sorts of ridiculous charges are made against it, not only by directors to duped shareholders in companies, but by persons who do or ought to know better. The Act is said to be the cause of shortening the hours of labour, although the boys are allowed to work 54 hours a week, and the men will only work 48. Again, it is said there is the expense of a "competent person" to look after the machinery, as if it could be prudent or profitable to allow machinery to go on without being looked after; then, again, it is said we are compelled to have a certificated manager; but is it a grievance to have some responsible person at every colliery who has daily control and supervision of it? and, again, it is said "look at the expense of a fireman and shot fire underground"; but would it be advisable or even profitable to allow every collier to fire his own shots or even to work in a fiery mine?

It has long been the custom of those itinerant agitators who trade on the credulity and ignorance of the honest hard working miners to hold up the Inspectors of Mines to their too credulous audiences as idle worthless public servants receiving large salaries and doing nothing for them, and at corners' inquiries has seemed to be a stereotyped question of delegates to ask if the witness "had ever seen an Inspector in the pit," the answer generally being "No," although it was well known he had been in the pit once, and sometimes twice, within 12 months; and on further questions being put the witness generally replied he "did not see him" or "knew him." These remarks are not intended to apply to all delegates, for it was with much regret that he heard the North Staffordshire miners had withdrawn their confidence from Mr. Brown, for he is quite sure he was worthy of better treatment, as no man could give them better advice than he did, or do more to save them from the consequences of their own foolish acts; and Mr. Wynne is sorry on his own account as well as on theirs, that so worthy a man has been driven away.

With regard to work done Mr. Wynne states that the work he has done during

1877 were by no means the heaviest duties he has performed in any year, as his able assistant, Mr. Gilroy, has taken so large a portion of the underground inspection. Mr. Wynne's table shows, however, that he has travelled 12,825 miles by railway &c.; he has been occupied 302 days away from home (including 154 general inspections, and 88 inquiries and adjournments) on official business; received during the year upwards of 5000 letters and posted over 4000 in reply without the assistance of a clerk and without allowance for office and store room for the mass of books and papers accumulated during his 25 years of office.

THE AMERICAN COAL TRADE.

The usual annual edition of the statistics prepared by Mr. FRED. E. SAWARD, the Editor of the New York Coal Trade Journal, has just been issued, and shows that the production during 1877 was 54,398,250 tons, no less than 22 States contributing to make up this quantity. In many of the Western States development is as yet scarcely commenced; thus, Utah has a plentiful supply of fuel, yet in 1877 only 10,000 tons were produced, and other coal fields show an almost equal discrepancy between contents and output. During 1877 the average price of anthracite varied from \$4.50 to \$7. Mr. Saward remarks that the condition of the anthracite trade during 1877 is fully shown in the low prices and immense tonnages. Both results were due to disastrous competition. The trade, as a whole, never passed through a more disastrous year financially. New markets were made from the low prices; but it remains to be seen if they will continue to hold them when prices are put to anything like a profitable rate. The combination that has been formed this year holds the output well in hand, and much good may result therefrom. The extreme mildness of the last winter season has resulted in the carrying over of large stocks, which will compete with any new coal that may be shipped on the various markets, to be sold at higher prices.

Referring to the Northern Pennsylvania semi-bituminous coal field, it appears that the first coal from the Blossburg district, in this coal field, was sent to market from the Bloss mines in 1840. The producers are the Fall Brook Coal Company and Blossburg Coal Company, with mines near Blossburg, Tioga county, Pa.; 75 miles of railway carries the coal from the mines to Seneca Lake, in New York State, where it is received into canal boats, which deliver it by the canal system of water ways throughout the State. The railway from the mines connects with the Erie Railway at Corning, N.Y., affording additional outlets to market by the railways of the State and their connections for the coal from this region, it being shipped as far west as Salt Lake City. The output in 1877 was 602,245 tons. The Clearfield coal region is located in Clearfield and Central counties, in the central portion of the State of Pennsylvania; for an outlet for the products of its mines it is dependent upon the Tyrone and Clearfield branch of the Pennsylvania Railroad, extending from Tyrone on the main line (224 miles west from Philadelphia) to Clearfield, 41 miles. The Pennsylvania Railroad Company owns the railroads, the shipping wharves, and all the means of access to the markets of the Atlantic seaboard. The advantage of being connected with a railroad of such magnitude with its wonderful ramifications and connections gives the coal proprietors of this region great facilities for the proper conduct of their business, and it is owing to the very liberal policy of this corporation that the district has been enabled to take the rank which it has assumed in connection with the fuel supply of the seaboard. The figures given of the production show that the market for this quality of coal has steadily increased while other districts fell off, its introduction at New York and the East having been most successful during the past year or two. The coal is used for steam purposes under stationary, marine, or locomotive engines, for making iron and steel rails, for glass works, in lime kilns, and many other purposes, being much liked wherever used; ignites freely, burns readily, and leaves a white ash. It is not easily friable, and bears transportation remarkably well.

The West Virginia gas coal is mined in Marion, Taylor, Ritchie, and Preston Counties, West Virginia, the mines being located near to or upon the main line of the Baltimore and Ohio Railway. The coal is used for gas making in the cities of the seaboard, and is very favourably spoken of. The veins are from 6 ft. to 11 ft. in thickness. The seaboard trade is only 100,000 tons, against 250,000 tons in 1870. The cause for a diminution of the trade to the seaboard is the cheaper gas coal furnished from Great Britain and the provinces, due to the low water freights. The introduction of coal from the Kanawha district, and the discriminating policy of the Baltimore and Ohio road, have also affected this region. The coal measures of West Virginia underlay nearly 16,000 square miles of territory, of which what are known as the Kanawha and New River Valleys, traversed by the Chesapeake and Ohio Railroad, hold 8000. Several varieties of coal occur, among which are Cannel, splint, gas, and bituminous.

Of the bituminous there are seams of different degrees of hardness and texture, from the friable coking coal, similar to the best Newcastle (England) coals, to the hard splint coals, with regular cleavage, similar to the Youghiogheny coals, so largely in demand in the western and southern cities, of so compact a nature that it can be used in an iron blast-furnace in its raw state. The bituminous coals are excellent steam-raising fuels, and have been used in steamers, railways, and under stationary engines with good results. The gas coal seam is identical with the Kittanning gas coal bed mined on the Alleghany river, in Pennsylvania, and has been used in the eastern and western markets with most satisfactory results.

The value and importance of the Kanawha coal district as a new source of supply from which good caking coals can be obtained is beginning to be understood and appreciated by gas manufacturers. These coals have established a good reputation, where they have been tested and used, for the quantity, purity, and illuminating power of the gas which they produce. A series of practical tests, recently made in the apparatus of a gaslight company from ordinary average samples of 1 ton (2240 lbs.) each from five different mines, and with the regular working charges of 224 lbs., as observed and certified by Professor P. de P. Ricketts, of the School of Mines, 10,000 cubic feet of 17½ candle gas as the average yield, and 12,428 cubic feet of 16 candle gas as the maximum yield. All the territory drained by the Kanawha and its tributaries between the Falls of the Kanawha and Campbell's Creek contains the seams of coal within workable reach, above water level, or by shafts at no great depth. It can be mined very cheaply; and the quantity available is vast beyond conception. The top seam of the lower coal measures disappears beneath the Kanawha at its confluence with Elk River at Charleston; while some of the coal seams reappear up the valleys formed by the Elk and Coal Rivers. Cabin Creek, Elk River, and Coal River are three considerable tributaries to the Kanawha, penetrating the country for long distances, and bringing into convenient working position thousands of acres of valuable coal land.

Coal is also found in Missouri over an area of 22,995 square miles, aggregating about 24½ ft. thickness of coal; in Ohio under 10,000 square miles; in Tennessee under 80,000 square miles, of which 60,000 are available; in Arkansas under 12,000 square miles, the coal found being semi-bituminous or semi-anthracite; in Iowa coal is worked in 26 out of the 100 counties of the State; in Alabama there are two distinct coal formations; in Illinois there is plenty of coal, it is very widely distributed over the State, and readily accessible; in Kentucky there are two distinct coal fields. The area of land known to be rich in lignite coal deposits in Colorado is about 7200 square miles, lying in various parts of the Territory on both sides of the main range. There can hardly be a doubt but that this extent will be largely increased in years to come, for new discoveries are constantly being made upon the foothills and plains. The area of the Indiana coal measures approximates one-fifth of the entire State, and embraces the counties of Perry, Spencer, Warlick, Posey, Vanderburg, Gibson, Pike, Dubois, Daviess, Knox, Martin, Sullivan, Greene, Clay, Vigo, Parke, Vermillion, and Fountain. The most important coals, from a manufacturing point of view, are those known as the lower block, 3 ft. 8 in. thick; the main block, 4 ft. 4 in. thick; and upper block, 1 ft. 10 in. thick.

Block coal has a laminated structure, and is composed of alternate thin layers of vitreous dull black coal and fibrous mineral charcoal. It splits readily into sheets, breaking with difficulty in the opposite direction. On burning it scarcely swells or changes form, and never cakes or runs together. What the celebrated English chemist Mushet said about a certain Welsh coal is equally applicable to the block coal of Indiana. To the purity of splint coal it unites all

the softness and combustibility of wood; and the effects produced by it in the blast furnace, either as to the quality or quantity of iron, far exceed everything in the manufacture of that metal with charcoal. In Utah there is a plentiful supply of fuel, yet the product of the coal mines for 1877 was only 10,000 tons. About 1000 tons of coke was made from native coal. There was 47,100 tons received from Wyoming Territory, and 10,680 tons of coke from Pennsylvania. The amount of information brought together is enormous, and the only matter for regret is that no general summary has been given showing the extraordinary resources of the Union at a glance.

SCHRAM ROCK-BORING MACHINE.

Judging from the number of engines for rock-boring which have been invented since the time when the Burleigh was the only practical rock drill in England, this class of machinery is evidently a favourite study with certain engineers, who are determined to leave no branch of industry independent of mechanical assistance, and who before they can come before the public with results of any value have to labour and experiment in the practical part not only of their own profession but also in that of the crafts which they seek to benefit by their inventions. In most rock-boring machines, in nearly all in fact, the piston actuated by compressed air or steam has, in addition to its primary and normal function of carrying the cutting tool, to work also the slide which admits the motive-power alternately to the upper and lower ends of the cylinder. To move the slide considerable power is required to overcome the pressure of air or steam, which holds it down on the slide face, and this power is taken from the force of the blow the piston is about to strike at exactly the most unfortunate moment imaginable—just when the stroke is nearly completed, and all the momentum and stored-up force is required to cause the cutting tool to penetrate as deeply as possible into the rock. The disadvantages of this system of an engine in which the slide is worked by levers or tappets have been so fully recognised by many engineers that machines working without slides have been constructed. But it is doubtful if any advantage is gained by overcoming the difficulty in this manner, as in most of the machines without slides the pressure on the lower end of the piston has to be overcome by making the area of the upper end unduly large, thereby involving a wasteful consumption of air or steam, which is fatal to general practicability in mines.

The rock-boring machine invented by Mr. Schram consists of a cylinder in which a double piston works at a high speed, making from 400 to 1000 strokes a minute. The cutting tool is carried in a socket at the extremity of the piston rod, and at every stroke its cutting edge is propelled against different radii of the circular hole it drills, by a device which causes the piston to partially rotate in making the backward stroke, thus ensuring perfect rotundity in the drilled hole. When air is admitted into the slide box (the slide between the double spindle-shaped slide rod and the main piston at the forward end of the stroke) it passes through the port into the cylinder, and pressing on the lower side of the piston, forces it back, causing it to make the backward stroke; the other end of the cylinder is, of course, at that time in communication with the outlet by a suitable passage. From the slide box a port communicates with a cylinder in the upper cylinder cover of the machine, and thus there is a constant pressure of the motive fluid employed upon the upper end of a small piston, which presses upon a break fitting at its pointed end into a grooved disc, and preventing it from turning. To this grooved disc is fixed a twisted bar, which fits into a nut in the end of the piston, so that as this piston makes its backward stroke it is forced to partially rotate along the twisted bar held fast by the secured disc.

When the main piston has passed the forward port air is admitted through that port into the slide valve cylinder. At that moment the opposite corresponding cylinder is in communication with the outlet through the backward port and the groove in the piston rod, so the slide piston with the slide is reversed, and the opposite port opened for the admission of air or steam into the back end of cylinder, whilst the forward end of cylinder is placed in communication with the outlet through a suitable port. The motive fluid being now admitted into the back end of the cylinder, passes through apertures, and counterbalances the constant pressure on the little brake piston, so that the pressure of the brake on the disc is removed, and as the piston is forced along on its forward or cutting stroke it turns the twisted bar and disc instead of being turned by the former. The next back stroke will be understood without explanation.

The perfect freedom of each moving part enables the machine to run at from 400 to 1000 strokes per minute, whilst the full power of the motive fluid is utilised for the stroke of the piston, and thereby conveyed to the tool which cuts into the rock. There is no division of force from the main piston in order to actuate levers, tappets, or any other parts of the engine. The actual consumption of compressed air is wonderfully small, one of Sturgeon's Class C No. 3 compressors running at 65 revolutions supplying sufficient air for three full-sized machines. The feed, which enables holes of 3 ft. in depth to be bored without change of drill points, is manual, as the machines are never fitted with automatic motion unless such is specially ordered.

For use in galleries or for driving tunnels the inventor of the Schram rock-boring machine has ingeniously designed a combined carriage and screw drill-standard, which runs on wheels, and is so constructed that the wagons used for removing the ore or debris can run right through it. The stretchers fit in sockets moving on pivots, and are secured between the roof and bottom of the tunnel by means of the screws in the usual way, pieces of hard wood being laid between the rock and the extremities of the stretchers. The machines are fixed on these stretchers by means of universal joints, which can be turned round the stretchers, and by means of the nuts raised or lowered, and which enable the machines to be inclined at any angle, so that the holes may be bored in any desired direction. The hose leading from the air receiver fixed on the back part of the carriage need never be disconnected from the machines, and as these always remain on the stretchers it is only necessary to connect the main hose with the air-receiver as soon as the carriage is fixed in position, and then boring can be at once commenced. When all the holes it is intended to fire are bored, the universal joints holding the machines are screwed fast in position on the stretchers, the nuts lowered on to the sockets through which they raise the stretchers about an inch above the bottom wood (the top screws having been previously slackened and the top wood removed), and then, as soon as the main hose is disconnected from the air-receiver, the whole apparatus, with machines, drills, picks, &c., upon it is wheeled back to a place of safety during the blasting. Should the roof of the tunnel be at any point too low to allow the stretchers to pass in an upright position they can be inclined back till they rest upon the framework of the carriage, being secured at the foot by the sockets. The top of the carriage forms a table very convenient for the wrenches, oil-cans, &c.

From the foregoing description it will be perceived that the defects in many existing rock-boring machines have been carefully noted, and the inventor claims to have found remedies. It is in practical working, however, that rock-boring more than any other class of machinery must be proved, and judging by the results claimed for the Schram it is anticipated that it must prove itself as eminently practical in working as it is theoretically correct in construction. Abroad indeed it is said to have been already successful, and though only just now introduced into this country it has already made a footing here, and employers of hand-borers are invited to give consideration to the claims of this new candidate for their approval.

EXPORT OF COAL.—The value of coal, &c., exported in the four months ending 30th ult. was 2,174,793/., against 2,236,496/., in the like period in the previous year.

Capt. Burton is said to be so satisfied of the wealth still existing in the mines which he recently inspected in Midian, that he intends to recommend the Khedive to allow him to form a company in England for the purpose of working them. Among the riches of

the region which Capt. Burton has examined, may be mentioned gold, turquoise, and pearl oysters.

Original Correspondence.

THE CAPE MINES.

Sir.—Can any of your correspondents account for the low price to which Cape Copper Mine shares have fallen—from 40s. to 42s. in 1877, to 29s. to 30s. at the present time? The decline in the dividend from 4s. to 3s. 10s. per annum can hardly account for it. That represents a decline of one-eighth in the dividend against a fall of more than one-fourth in the price of the shares. Never has the produce been so good. Not long ago a heavy sale was made of ore, averaging 38 per cent., and 33 per cent. seems now about the minimum average, which is much above the return of former years. The disturbances at the Cape have perhaps alarmed holders; but the mines are hundreds of miles away from the revolted districts, and there is no inducement for Kaffirs or Hottentots to make a raid upon Namaqualand, a barren district where they could find absolutely nothing to eat, unless they could make a meal off copper ore.

London, May 23. W. W.

P.S.—Can any of your mining friends point to any other mining property that can pay the dividends the Cape pays with copper at 60s. to 62s. per ton? Let copper only go to the very moderate price of 65s. and we shall then see our 1s. per quarter again. That time cannot be far off. Where else can such ores be found at an easy distance from home?

NEW QUEBRADA COMPANY.

Sir,—I quite agree with your last week's correspondent that the long interval which has taken place between the return of Mr. Darlington from the company's property and the date of his taking proper measures to put into force what he knew (as well a year and a half ago as he knows now) to be requisite for the company's good, appears to be equally unnecessary and unseemly.

Among the very few things which Mr. Darlington seems to have been positively assured of in connection with the company's mines was the fact of a very large quantity of low-grade ore—yellow pyrites—being immediately available for concentration. This he was bound to accept as a fact, as the mass of the mineral stood "palpable before his eyes," and much of it was broken and put in pile, so that he might examine it as he would a cheese upon a table—which calls for no high order of prophetic instinct. But seeing that 70,000 tons of this ore were in readiness for manipulation, how is it possible that nothing has been done with it even to this day, when in three months' time concentration works might have been erected and put in operation, with a large unquestionable profit to the company? The answer to this (by the directors) will most likely be—want of money. But they seem to have been revelling in plenty of money. The balance-sheet, just sent out, shows that for the year the "consulting engineer" (Mr. Darlington) has reached the luxurious figure of 1150l. (Mr. Darlington is the company's consulting engineer). Again, 200l. extra has been paid to Mr. Hemming (besides his ordinary directors' fees) as managing director. What management? And now we are asked for more money!

AN OLD SHAREHOLDER.

FLAGSTAFF SILVER MINING COMPANY OF UTAH.

Sir,—I have read in your valuable Journal, under date of 4th and 18th inst., two letters signed "A Lawyer," in the former of which the writer states that the directors were selling the debenture bonds for the value of their spoilt stamps. This is totally incorrect. The facts are as follows:—With the view of a loan being negotiated in America certain debenture bonds, amounting to 30,000l. (the greater part being 1000l. bonds), were stamped for this particular purpose, and were taken out to America in June last. As the loan was not negotiated, and these (unexecuted) debentures being too large for the home purposes of the company, they were cancelled, and the value of the "spoilt stamps" (being some 30l.) was returned at Somerset House. The company's debentures are now, and have always been, a good security, and those now to be issued will rank *par passu* with those already issued, being secured by one and the same mortgage. Respecting the Tarbet suit, which "A Lawyer" says should have been mentioned in the circular asking for subscriptions, the particulars have been duly communicated to all the shareholders in the report of the extraordinary general meeting held March 4, and in former circulars; and it is not only believed by all parties that this suit will go in favour of the company at the coming term of the Court, but that opinion is strongly expressed in Mr. Pearson's own scheme, which "A Lawyer" lauds so highly. Besides, should the suit go against the company it would be immediately appealed against to the Supreme Court at Washington.

Great Winchester-street, May 24. A. A. DE METZ, Secretary.

[For remainder of Original Correspondence see this day's Supplement.]

FOREIGN MINING AND METALLURGY.

Iron has continued in comparatively feeble demand at St. Dizier. In the Loire-et-Rhone district some orders have come to hand; and the demand for iron has still been comparatively restricted, however business men maintaining an attitude of considerable reserve. In the Franche Comté district the production is being somewhat restricted, and this is, probably, a prudent course. Notwithstanding this, quotations are fixed with some difficulty in the Franche-Comté group; tariffs are nominally maintained at 7s. 4s. per ton, but transactions could be readily carried through at 6s. 16s. per ton.

The ratio of the working expenses to the traffic receipts upon the Northern of Spain Railway was reduced last year to 37.40 per cent., as compared with 39.62 per cent. in 1876. The directors are proceeding with their policy of substituting steel rails for iron rails upon the system, and they expect to realise by this means further economies in regard to the maintenance of way. The length of line laid with steel rails last year upon the network was 46½ miles. The aggregate length of line steel railed was thus increased to 121½ miles. The Barrolo mines last year furnished the company at a cheap rate with the coal required for the working of its lines.

The Belgian coal trade has remained extremely quiet; so dull indeed has been the demand that notwithstanding a reduction in the number of working days, and an extremely reduced extraction, stocks exhibit rather a tendency to accumulate at certain points. The navigations will shortly close on the canals, but supplies are, nevertheless, not being pressed forward with any activity, as consumers cannot see very far before them, and prefer to drift on from day to day. The Concorde United Collieries Company was worked at a loss of 285s. last year; this loss was about 1 per cent. upon the paid up share capital. The Royal Asturian Mines Company will pay a dividend of 2s. 16s. per share for 1877; payment of this dividend is to be commenced July 1. The Nouvelle Montagne Company will pay a dividend of 6s. per share for 1877. This dividend is to be distributed as follows:—2s. per share June 30, and 4s. per share December 31.

Contracts were let last week at Brussels for 470 trucks required for the Belgian State Railways; three lots, each comprising 50 closed trucks to carry 10 tons each, and adapted for horse and live stock traffic, were let at 142s. 16s. to 143s. 17s. 7d. per truck; the lowest tender was delivered by the Dyle Workshops Company, Louvain. From other lots, each comprising 64 closed trucks, to carry 10 tons each, were let at from 111s. 19s. 2d. to 124s. 19s. 2d. per truck; the lowest tender was delivered by M.M. Delforge and Co., of Seneffe. Upon the whole, the rates prevailing at this adjudication showed little variation; the situation has not, in fact, materially changed. There is a great want of work, and industrials do not discuss too much or too keenly any proposals made to them. The Metallurgical and Colliery Company has just obtained an order for the ironwork required for a bridge over the Sambre; the amount of this order is 3720s.; the original estimate was 5054s. Iron for construction purposes, girders, and merchants' iron, as well as rails, are neglected upon the Belgian markets; the aspect of affairs has, in fact, not improved. Belgian industrials appear to be well content with the general display which Belgium has made at the Paris Exhibition.

The annual report of the directors of the Vieille Montagne Zinc Mines and Foundries Company, referring to the coal mining operations of the company, states that in consequence of the considerable fall in coal—a circumstance favourable for the rest of the company's zinc works—the Balday Lalore Colliery did not yield sufficient profit last year to cover the cost of certain preparatory works carried on. The Valentin Cocq Colliery, also owned by the company, has been closed for the present, the operations carried on in it having been found to be sterile and unprofitable. The cost of this colliery to the company had, it may be remarked, been redeemed by allocations successively made out of profits. The pro-

duction of coal effected by the company declined from 78,100 tons in 1876 to 53,499 tons in 1877.

SALES OF COPPER ORES.

COPPER ORES SOLD AT THE CORNWALL TICKETINGS, FOR THE QUARTER ENDING MARCH 31, 1878.

Mine.	Tons.	Amount.
South Caradon	1410	£7,383 7 0
Devon Great Consols	2018	6,555 17 0
West Tolgus	1000	6,549 2 0
Mellaneur	1381	5,503 1 6
Marke Valley	1020	2,922 4 6
Gunnislake (Clitters)	695	2,870 19 0
West Seton	612	2,497 11 0
Glasgow Caradon	650	1,982 15 6
Hingston Down	409	1,212 15 6
East Pool	366	1,195 14 6
Bedford United	361	1,182 2 6
Levant	134	1,077 3 0
South Crofty	325	737 2 6
Phoenix	170	453 3 0
East Caradon	120	459 0 0
Carn Brea	130	322 18 0
Wheal Crebor	119	293 4 6
Wheal Maria and Fortescue	108	242 17 0
Wheal Bassett	43	237 7 6
Gawton	108	220 17 0
Treffry's Regulus	27	210 12 0
West Godolphin	27	173 0 0
North Bury	38	170 1 0
Wheal Comfort	38	162 9 0
South Roskear	29	126 3 0
North Treskerby	31	120 2 6
West Bassett	27	104 12 6
Killifreth	24	87 0 0
Penwithall	27	81 0 0
Wheal Russell	45	81 0 0
Champion's Ore	22	66 0 0
Wheal Grenville	10	58 0 0
Roberts's Ore	14	46 4 0
Penberthy's Ore	12	34 10 0
Dingle's Ore	10	39 5 0
West Roskear	21	34 2 6
Davey's Ore	5	21 2 6
Prince of Wales	22	14 6 0
Williams's Precipitate	1	12 7 6
Stephens's Ore	17	12 7 6
Poldice	5	9 15 0

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Purchasers.	Tons.	Amount.
Vivian and Sons	3516	£213,845 7 9
P. Grenfell and Sons	951	4,721 1 3
Nevill, Druce, and Co.	2255	8,115 15 5
Williams, Foster, and Co.	3457	11,818 6 7
Mason and Elkington	1191	3,451 14 6
Charles Lambert and Co.	9-9	3,454 7 0
Total	12,330	£245,407 12 6

COPPER ORES SOLD AT THE SWANSEA TICKETINGS, FOR THE QUARTER ENDING MARCH 31, 1878.

Mines.	BRITISH.				Tons.	Amount.
Berehaven	616	£ 3,411 3 6
Tignory	23	434 14 0
Knockmahon	84	231 5 0
Cronebane	3	147 3 0
Total	726	£ 4,224 5 6

COLONIAL.									
Betts Cove	...	...	...	...	...	...	6743	...	£23,775 0 0
Union Ore	...	...	...	...	...	...	1035	...	3,324 11 6
Emily Ore	...	...	...	...	...	...	25	...	112 11 0
Total							7803		£27,212 7 6

Total	1,903	£22,175 1 0
FOREIGN.		
New Quebrada	1449	£ 8,435 15 6
Seville	1058	3,491 7 0
Portuguese	142	2,193 1 0
Cavera	467	1,730 2 6
Carracedo	300	1,392 13 6
Aljustrel	405	1,250 16 0
Negrillio	201	723 12 0
Italian Ore	112	432 19 6
Cuba	14	370 14 6
Yannoni	33	177 7 6
Almodovar	19	145 10 0
Total	4349	£20,312 10 6

RECAPITULATION.																		
British	726	...	...	£ 4,224	5	6
Colonial	7803	...	...	27,212	7	6
Foreign	4349	...	...	20,312	10	6
Sundries	199	...	...	4,729	7	0
Total	13,078	...	...	£56,469	10	6

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Purchasers.	Tons.	Amount.
Copper Miners Company	1122	£4,645 14 3
P. Grenfell and Sons	1150	5,282 8 9
Nevill, Druce, and Co.	933	5,471 3 3
Vivian and Sons	4184	16,744 2 6
Williams, Foster, and Co.	2954	14,282 18 3
Mason and Elkington	1620	5,533 19 6
Sweetland, Tuttle, and Co.	902	277 9 0
Landore Copper Company	209	1,731 9 0
Total	13,078	£56,469 10 6

THE WEEK.

SATURDAY, MAY 13.—The conditions were made known to-day, on which holders of Metropolitan stock may obtain allotments of the new 200,000l. stock, issued for the extension to Willesden, only holders of 200l. stock and upwards participating. The proportion allotted of the new will be 50l. new stock to every 1000l. now held, 60 per cent. to be paid this year, the last payment being on Sept. 1, 1879. The new stock is not to bear interest until July 1, 1880, but it will be allotted at par, the price to-day of the old being 113s. In mines Cape Copper advanced to 30, Van to 21, and West Chiverton to 10. A nominal rise of 2s. was reported in Carn Brea.

MONDAY.—York, A., has now reached 110, and probably is high enough, considering that the last year's dividend was only 4 per cent. Investors, however, never forget that in 1875 the price was 167½, and the low price now ruling invariably tempts buyers. Metropolitan District, 58½ to 59½, which is surely sufficiently high. United States Rolling Stock, 14 to 14½. General Credit, 5½ to 6. Liebig's Extract, 29 to 30. Milner's Safe, 7½ to 8. National Discount, 9 to 9½. United Discount, 6 to 6½. Brighton Aquarium, 9½ to 10. Royal Aquarium, 3½ to 4. National Safe, 3½ to 3¾. In Mining shares Flagstaff was dealt in at 1, and Colorado at 27½. Last Chance, ¾ to 1. New Zealand Kapanga, 10s. to 12s. 6d. New Quebrada, 1½ to 1¾.

TUESDAY.—Egyptian stocks had a most important rise on various favourable rumours. Large buying orders were received from Paris. Among other things it was stated that the Commissioners saw no reason for reducing the interest paid on the United debt. These bonds rose nearly 3s. to 37; they might even double their present price if financial matters were placed on a sound basis, and confidence restored. In the preference the advance was 2½, to 61. In railways, York, A., was again pressed for sale; at one period there was a fall of ¾, but at the last the price was only 1½ down on the day (108¼ to 109). Franco-Egyptian Bank, 1¼ to 1½; Mercantile River Plate, ¾ to 1; Anglo-Austrian, 7½ to 8; London and South-Western, 7½ to 8.

WEDNESDAY.—Cable securities continue weak, the following being the prices now ruling: Anglo, 58½ to 59; Brazilian, 6½ to 7; Cuba, 9½ to 9¾; Direct, 12½ to 13; Eastern, 7½ to 7¾; ditto Extension, 7½ to 7¾; Globe Preference, 10½ to 10¾; Great Northern, 7½ to 8½; Silver, 24½ to 25; West India, 2¼ to 2½. In 10½; sympathy with the continued advance of Egyptian stocks. Bank of Egypt rose 2½, to 28, and Anglo-Egyptian 1½, to 12. At one period of the day Egyptian United, 28, and Preference were 2½ higher than yesterday, but this was not fully maintained. Ultimately the United closed at 38½, and the Preference at 62½. In mining shares West Chiverton were quoted no better than 8½, while Richmond fell 10s. to 9; Royal Aquarian shares have now receded to 3½.

THURSDAY.—From a circular issued by the Mexican Railway Company it appears that the net receipts for the first quarter of the present year show an advance on that of last year, and may, in the opinion of the board, be considered very satisfactory. Altogether the company has improved its position very considerably. Last year at this time the A mortgage bonds were selling at 96, B at 70, and C at 45, the prices now being 105, 98, and 97 respectively. The ordinary shares (20l. paid) have during the same period only improved from 1 to 1½. As the bonds have now recovered to the quotations ruling in 1875, there seems no reason why the shares should not do the same, which would bring them up to 3½.

FRIDAY (Opening).—The markets are very firm, and prices are higher than last night. Consols are 95½ to 95¾; Egyptian United have touched 40, the Preference being 63½ to 65½. In railways there is some strong bidding for Metropolitan, which has advanced to 115. Several enquiries are being made for South France mining shares, which are quoted 2½ to 2¾; a slight improvement in the tin market would soon see these shares 5l. Van shares are in demand at 21½. West Chiverton, Roman Gravel, and Tankerville being neglected. Two o'clock.—Metropolitan Stock has reached 116½, while 2 premium is being bid for the new stock. Other stocks show little change. Egyptian United is being bid for the opening. Silver and gold mining shares continue to meet with considerable demand. Port Phillip, 10s. to 12s. 6d.; Javali, ¾ to ¾; Pestarens, 4s. to 6s.; Chaco, 10s. to 11s.; Eberhardt, 6½ to 6¾; Richmond, 9 to 9½; Malabar, Malabar, Rio, and Rosca Grande are nominally ¾ to ¾. Four o'clock.—The weakness shown at one time in Egyptian United has passed off, and the bonds are now firm at 41. Consols show no change, and Russian 73 are 79½ to 80. Metropolitan

stock slightly lower. Chapel House Colliery, 3 to 3¼; Newport Abercorn, 3 to 3¼; Grogwinion, 3 to 3¼; Wye Valley, 1¼ to 1½; Aberdaunt, ¼ to ¾.

FERDINAND R. KIRK.

IMPROVED DOORS FOR PUDDLING FURNACES.

To facilitate the fastening and releasing of puddling furnace doors an improved arrangement has been invented by Mr. JONATHAN EDWARDS, of Prince's End, Tipton. He joins to the front of the door frame of the furnace, and at about the middle thereof, a lever fastening, consisting of three sides of a rectangular frame. The free ends or extremities of the two shorter sides carry pivots which turn in open bearings made in brackets at front of the door frame. The other ends of the short sides are connected together by the longer side, which constitutes a handle to which the lever fastening may be moved for fastening or unfastening the door. The free ends of the short sides of the lever fastening are expanded into a circular figure eccentric to the pivots, and constituting cam-like ends. When the sliding door has been lowered in its frame, and the lever fastening brought into a horizontal position, the cam-like ends forcing the door firmly against the door frame. In order to release the door the lever fastening is lifted from the horizontal to a nearly vertical position. By this motion the acting parts of the eccentric or cam like ends of the fastenings are removed from the door, and the door is released and may be raised. When the lever fastening is lifted into its unfastening position, it is held in that position by a lever catch at one side of the door frame. On the under side of this catch is a notch, and on one of the shorter sides of the lever fastening is a projection which is inclined or bevelled on its upper face. When the lever fastening is lifted from its horizontal position its projection strikes against and raises the lever catch; and when the lever fastening is at the proper height to unfasten the door the said catch falls, and its notch engages with the projection on the said lever fastening and holds the latter in its raised position.

When a clear space is required at the front of the furnace door for repairing the furnace or otherwise, its fastening mechanism may be readily removed by lifting its pivots from the open bearings in the brackets at the front of the door frame. The lever catch may also be removed by withdrawing its joint pin. He uses a peculiar construction of rabble hole stopper, and in order that the stopper need not be detached from the furnace door when the rabble hole is required to be opened, he hangs the said stopper on a hook like peg above the stopper hole, an eye at the summit of the front plate of the stopper taking upon the said peg. Upon this peg the stopper is capable both of sliding and swivelling. To remove the stopper from the rabble hole the stopper is drawn forward, its eye sliding on the peg until the lined fire-clay chamber of the stopper is withdrawn from the rabble hole; the stopper is then turned on the peg through a quadrant, and made to rest on a foot or support on the front of the door. The rabble hole is thereby left clear for the rabble. In order to reduce the bulk of metal around the rabble hole inside the furnace door he makes the outer edges of the metal block fixed around the inside of the said rabble hole with inclined or bevelled edges instead of square edges, as usual. The edges of the fire-clay lining bricks which are situated around the said block are correspondingly bevelled or inclined, so as to fit closely against the inclined edges of the rabble hole block. The fastening herein first described, as applied to a puddling furnace door, may also be applied to the sliding doors of heating, mill, and forge furnaces, and other furnaces having sliding doors.

HINGSTON DOWN.—A shareholder informs us that at the half-yearly meeting held on Monday (referred to elsewhere in our columns), it was contemplated that an effort would be made to upset the decision of the London directors to dispense with the services of the late manager, who has been unable to attend to his duties, through illness, for many months past, and which has apparently given some of his friends great offence, and has caused no little unpleasantness between certain members of his family and the directors. That the directors were perfectly justified in their action there cannot be a shadow of a doubt, and to guard against any attempt to interfere with their determination they invited the support of the shareholders at the meeting to uphold them in their resolution to carry on the affairs of the company in such manner as they thought best, and we believe we are correct in saying that they held proxies for nearly 10,000 shares. This is the best answer to any insinuations or remarks as to their incompetency to look after their co-shareholders' interests, and, to say the least, is equivalent to a well-deserved vote of confidence.

DEATH OF A "BONANZA" KING.—One of the millionaire magnates of the earth—William Shoney O'Brien—passed away on May 3. Thus briefly may the announcement be made of the death of a man whose career may be regarded as one of the most remarkable of modern time—a romantic chapter in the history of the financial world, which parallels the pages of Aladdin's romance, and (as far as wealth goes) pales into insignificance the daring conceit of Monte Christo. Born near Abbeyliff, Queen's County, Ireland, some 52 years ago, Mr. O'Brien emigrated to America at an early age. At first a resident in New York, he was stricken—like nearly all the daring and adventurous spirits of the time—with the gold fever of 1849; for him that fever produced golden fruits. It was in 1856 the memorable partnership was established of "Flood and O'Brien," a firm whose name has become a household word throughout the world. His wealth has been estimated at \$20,000,000. The great names will still ring through the halls of finance the world over, but genial O'Brien "sleeps in dull cold marble, where no mention of him must more be heard."

TO MINERS IN NORTH AMERICA.

CHEMICAL LABORATORY AND GENERAL MINING OFFICES,



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REFERENCES.

In England—The London Mining Journal, and leading Cornishmen.

In California—The Mining and Scientific Press, and principal Miners & Bankers.

WILTON'S MATHEMATICAL INSTRUMENT ESTABLISHMENT,

REMOVED from St. Day to A. JEFFERY'S, CAMBORNE.

W. H. WILTON begs to thank his friends for their liberal support for so many years, and informs them that (having opened business at Valparaiso) he has now declined business in England in favour solely of Mr. A. JEFFERY, MATHEMATICAL INSTRUMENT MAKER, CAMBORNE, whom he considers (having been an assistant to his father for several years) in every way capable of creditably maintaining the good name universally awarded to Wilton's instruments.

A. JEFFERY

Respectfully begs to Inform Mine Managers, Surveyors, Engineers, &c., the having purchased Mr. Wilton's business, and the very valuable acquisitions and appliances belonging thereto, he has enlarged his Mathematical Instrument Manufactory, and is prepared to supply THEODOLITES, DIALS, POCKET DIALS, LEVELS, TRAVELLING AND PLAIN PROTRACTORS, CASES OF DRAWING INSTRUMENTS, MEASURING CHAINS AND TAPES, ASSAYERS' SCALES AND WEIGHTS, ENGINE COUNTERS, and, in short, every description of Instruments used in SURVEYING, MEASURING, MAPPING, &c.

Requiring in all its branches promptly attended to.

BRITISH MINES.

ing below the 50, and I expect to make good progress without interruption, everything is now in good working order. The lode in the shaft is about 6 wide, and now mostly composed of quartz, with good stones of blende and spe of lead.

pearance, composed of killas and spar, strongly intermixed with ore, and from its general character we may expect to have a good improvement here shortly. The stope over the 52, east of No. 2 shaft, is worth fully 1 ton of ore per fathom. I am pleased to say the winze from the 40 is holed in this stope, which has given good ventilation. &c. The men who were employed in sinking this winze have been

TEMPLE.—May 22: There is little alteration in the different levels to report this week; the lode continues of the same favourable character, and the product is the same as last reported. At surface the proposed water course has been

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LEAD MINES have been moderately active, but show very

change, and quotations are for the most part nominal. Roman Gravel, 7½ to 8; the sale of ore for four weeks (180 tons) realised 1876. 10s. The 110 end is worth 1 ton. The 95 south 4 tons. The 80 south 5 tons. The 65 south 2½ tons per fathom. Ladywell, 3 to 4; the sale of ore here (25 tons) realised 228. 15s. Tankerville, 1; the sampling next week will be 100 tons of lead. Van, 3½ to 4½; East Van, 4½ to 5; D'Eresby Mountain, 80 to 100; D'Eresby Consols, 11 to 12; Great Laxey, 18½ to 19½; Leadhills, 21 to 23; Llanrwst, 2 to 2½; Pandora, 15s. to 20s.; Bodidris, 1 to 3½ to 4; Llanrwst, 2 to 2½; Pandora, 15s. to 20s.; Bodidris, 1 to 3½ to 4; Rookhope, 17s. to 19s.; Tyn-y-Fron, 1½ to 1¾; Temple, 4½ to 4¾; West Chiverton, 7 to 8; Wye Valley, 1½ to 1¾; this mine sold on 23 to 3½; the sale here on the 22nd was 40 tons of lead ore, at 17s. 6d. per ton, and the mine has improved. Grogwinion, 3 to 9½; Denbighshire, 15s. to 25s.; Aberdaunant, 4 to 5; West Pateley 3½; Denbighshire, 15s. to 25s.; South Cwmystwith, 3 to 4; St. Bridge, 2 to 3½; Mawston, 55 to 60; Hartington Moor, 1½ to 2; Red Rock, 1½ to 2½.

FOREIGN MINES.—Birdseye, 3 to 1; Blue Tent, 3 to 3½; Hultafall, 4½ to 5; Don Pedro, 3 to 4; Eberhardt, 6½ to 6¾; Flagstaff, 17s. 6d. to 22s. 6d.; Chontales, 10s. to 12s. 6d.; the directors' report for six months, ending Dec. 31 last, show a profit made of 243. 1s. 9d.; the costs, including London management, were 4003. 3s. 4d.; gold returned, 1634 ozs., value 4246. 5s. 8d. During the six months in question 8900 had to be expended in new machinery and repairs, which is now in good order, and the manager hopes soon to be in a position to treat 3000 tons of ore per month, and the directors hope their next report will be satisfactory to the shareholders. Frontino and Bolivia, 1½ to 2; New Quebrada, 1½ to 1¾; Pestarena, 4s. to 6s.; Port Phillip, 10s. to 12s. 6d.; Richmond, 8½ to 9; Santa Barbara, 25s. to 30s.; New Zealand Kapanaga, 3 to 5.

The Market for Mine Shares on the Stock Exchange has really shown very little improvement, although the general opinion is that there is no doubt that war will be averted, and that the prospects of a speedy improvement in commercial and industrial affairs are now brighter than for some time past. The public have shown greater disposition to embark in the new undertakings put forward, and it is much to be hoped that the results achieved will justify their anticipations. The North Wales local correspondent of the Journal, in his letter this week, with regard to one of them, expresses approbation of Captain John Roberts' sketch map of the Llanrwst district, and adds—"I knew the whole region long before it was yeilded D'Eresby. Let us hope the name will be associated with successful mining in future, otherwise it will be the memento of a fizzle, as the Americans call it. I would rather the former, but the result has to be looked for." At East Pool a dividend of 2s. 6d. per share has been declared. The improvement in copper in the London metal market, and of copper ore at the Cornish ticketing, has created a much better feeling with regard to many mines, and this will, no doubt, extend itself to the market generally.

The Devon Great Consols general meeting is convened for Wednesday, and the proceedings are likely to be very interesting from the discussion which will naturally be raised upon the general question of management. It has been freely asserted in somewhat disparaging terms that the return to the calendar month system has been chiefly brought about by the acting chairman—Mr. Peter Watson—but, assuming the assertion to be correct, it should certainly be concluded that he is rather entitled to credit than disparagement for the course he has adopted, and it is probable that after the meeting the miners will be ready to join with the shareholders in thanking him for having promoted their interests. The reforms which have been commenced in returning to the calendar month system will probably be the means of restoring the mine to the dividend paying condition, whilst the continuance of the present—or, perhaps it may be said, past—corruption would inevitably have led to the "knacking" of the mines, and would have deprived the miners of employment altogether. It is on record that when the alteration took place some six years ago the Chairman (Mr. A. W. Thomas) was strongly opposed to the introduction of the four-week system, and it is confidently stated that now he will not interfere one way or the other, giving as a reason that as he has not attended any of the board meetings for some eight months, having been and still being on the Continent for the benefit of his health, he is not prepared to discuss the question. This also accounts for his not seeking re-election as a director. With judicious and economic management, but not otherwise, Devon Great Consols will again become a great mine. It will be seen from the abstract of the report, published elsewhere, that the value of the property and assets is 87,347. 10s., whilst the liabilities, including 3000. due to the bankers, amount to but 17,732. The credit balance of 69,615. is to a great extent unrealisable at present, but is of fully the value stated for carrying on the mine. The shareholders have to determine whether they will utilise it by economy or sacrifice it by extravagance. The calendar month system may be regarded as settled, but the shareholders must not stop there. The number of superior agents must be reduced to little more than half, and it is declared by competent authorities that there are several scores of persons, including a large proportion of monthly men, whose services could be dispensed with without in any way lessening the efficiency of the working staff. Let this question be fully discussed at the meeting when the shareholders and local officers are face to face. As to the miners, they will be benefited by the change, and if they also consider the suggestion to establish co-operative stores, which is made by a Tavistock correspondent in to-day's Journal, they may have cause henceforth to regard the recent agitation of Mr. Peter Watson—if they choose to call it so—as one of the greatest boons ever conferred upon them.

Cape Copper, 29 to 31; the returns for March were—from Ookiep, 970 tons of 31 per cent. produce; and from Spektakel and Nababeh together about 24 tons of about 28 per cent. produce. On April 24 the company sold 340 tons at an average of 12s. 1½d. per unit. On May 8 they sold 490 tons at 11s. 10d. per unit. These prices do not appear to differ widely from those which would have been given at the ticketing had the sales been made in the usual way. The report of the directors prepared for presentation at the meeting on Wednesday shows that there was a net profit for the year of 83,579. 18s. 3d., of which 22,540. 8s. remains available, as 55,000. has been distributed in dividends, and other amounts have been disbursed for income tax, sinking fund, &c. The arrangement for converting a portion of the company's produce into "best selected" has worked satisfactorily, and altogether the progress made has been good.

Hornachos, 12 to 12½; the company has received another shipment of 60 tons of silver-lead ore, making 250 tons in all since Jan. 1. The whole of the ore is from the Descuidada Mine, and the average price realised has been 32s. 1s. 1d. per ton.

St. John del Rey, 305 to 315; the latest telegram from Morro Velho, dated Rio de Janeiro, May 17, states that the produce for the first division, eight days, of May was 9500 oits., of the value of 3681. the ley of the ore being 5.5 oits. per ton, equal to 6.6 by the old measurement. All is going on well. Don Pedro North del Rey, 5½ to 6; the directors' report, prepared for presentation at the forthcoming meeting, shows that the gold and silver produced amounted to 52,669 oits., or 6073 ozs. Troy, realising the sum of 23,172. The mine is doing well, and the pumping machinery and other prospective works, have been 28,395. 5s. 2d., leaving a deficit of 4941. 1s. 8d.

Richmond, 8½ to 9½; the usual weekly telegram from Eureka states that the week's run was 875,000 tons of ore. During the week the refinery produced 56,000. The Eureka Sentinel states that several important improvements of an economical nature have been made at the Richmond works during the past week by direction of manager Probert. Many annoying delays in the operations at the refinery have been experienced during the last six months, consequent upon the necessity of closing down in order to clean out and repair the boilers. A connection has been made by means of a 5-inch pipe with the furnace boilers, and the steam needed for the crystallising and calcining the operations are continuous. Some fear was expressed that the length of pipe through which the vapour is conveyed would act as a condenser, and thus vitiate the quality of it, but instead of this actual experiment which has been made demonstrates that it is delirious. Since the connection was made everything has gone smoothly, and we are of the opinion that Mr. Probert has made a most important improvement. The refinery boilers are undergoing extensive repairs, new flues and plates being put in, and as soon as completed they will be ready for any emergency that may arise. It is a busy scene in and around the works, but everything moves with the system and regularity of clockwork. The Eberhardt tunnel has passed the 3000-ft. mark, and the header is again in vein matter, which gives encouraging hopes of the near approach to something more valuable. The tunnel is now in the vicinity of ground that proved very valuable near the surface, and its course during the next 500 ft. will be watched with much interest both here and on the other side of the Atlantic. The management entertain great hopes of the next two or three months' explorations. The rise in the drift is being explored with a force of 20 miners, and a large body of quartz is being penetrated, the assays from which continue to improve. The company's mill is undergoing repairs, and will probably be ready to start early in June.

Last Chance, 3½ to 4½; it is announced by telegram that the chairman, at the mine, has sold a test parcel of ore averaging 873 per ton. Colorado United, 2½ to 3½; it has been announced by telegram that the sales of ore for April amounted to 18,000, and that the mine is looking well in the level west of the Union tunnel and in the eighth level.

The latest advices from the bonanza mines state that at the Consolidated Virginia the shaft has been shut down for repairs, which

will take some 60 days. During that time from 300 to 400 tons of ore per day will be hoisted through the Ophir and C. and C. shaft, so that the production of the mine will be at least sufficient to pay all the running expenses, and a regular monthly dividend of 81 per share. The California daily yield is 650 tons of ore, keeping the mills crushing to their full capacity. The ore stops are all yielding good ore, and show finely; in fact, there is no change of interest in any of the ore producing sections of the mine. The Sutro Tunnel has nearly reached the western boundary of the Senator Mine, opening it to a depth of 1600 ft. below the surface. Having made full arrangements with the Tunnel Company whereby the mine can be worked through the tunnel, the Senator Company can now start lateral drifts at the most eligible points whenever they deem it expedient.

The market for Hydraulic or Gold Washing Mines has been unchanged, and prices remain at last quotation. The abundant water supply, and rain still falling, is keeping the miners in full work, and local exchanges say that not for many years have the mines been so actively employed, or the mines yielding so well; in fact, the mining industry throughout California is flourishing, and the prospects for a continuance for some time to come is unusually good. Blue Tent, 3 to 3½; excellent progress is being made at the various claims, and washing is steadily carried on; the company have a fine supply of free water, and are using it to the best advantage. Birdseye Creek, 4½ to 5; the advices from the manager are satisfactory, and prospects cheering. The Waluma claim is opening up rich, and will be in position to make returns before the end of the season. The age of Fall Creek Water Company advices that work has been commenced on the short connecting ditch, and he expects to have it finished and the stored water available for use by the end of June. At Little York hydraulic in the Empire and Christmas Hill Mines has been resumed, and report steady progress since Jan. 1: 2000 in. of water, forced through three giants, is brought to bear in removing the debris from the Empire Mine, and 20 men, assisted by a Derrick, are employed in blasting and removing boulders. At the conclusion of last season's washing a heavy powder blast was exploded, which, together with the pulverising of a large amount of the bottom gravel, caused an extensive slide of clay from the upper strata, which will take some time yet to dispose of. But one clean-up has been made, resulting favourably.

Hultafall, 4 to 5; there is no change to report in the underground workings. The lode continues to yield rich lead and blende, and good progress is being made towards finishing the dressing-floors. A crusher will be sent out by next week's boat, and within a fortnight of that time it may be expected to be in work, when large quantities of lead and blende will, it is anticipated, be rendered marketable, and sent forward for sale. The analysis of the slimes as roughly dressed gives 72 per cent. lead.

Lead Mines have been more actively dealt in, with in some few instances better prices. Van, 20 to 22; the mine is looking well, especially in the 105 and 90 west, where driving is continued upon a promising lode. Seaham's shaft is nearly deep enough to enable the men to commence driving at the 120 ft. level. Grogwinion, 3 to 3½; the manager's monthly report states that an important change has occurred in the 50 ft. level on No. 3 lode, where, in course of driving, a portion of the lode has been cut into standing off to the north of the level, which appears to be the main producing part, and far superior to anything that has hitherto been met with. The manager says "it cannot be of very great importance, as it will be standing when and untouched from this point up to the shallow adit level, a height of from 50 to 60 fms." The new discovery below the deep adit continues productive, being worth 2 tons per fathom at the bottom of the winze, which is now down 13 fms., and in rich ore ground the whole distance. All other points in the mine looking well. Wye Valley, 1½ to 2; a parcel of lead was sold on Tuesday at 9½. 15s. per ton. The lode in the 46 (bottom) level is yielding both lead and blende, and looking promising, and the winze below the 22 is producing good ore. The prospects of the mine have improved, particularly in the 22 and Pippit's shaft, and there are good indications of large deposits of mineral being soon opened out. West Wye Valley, 2½ to 3½; 40 tons of lead have been sold this week at 9½. 17s. 6d. per ton. The monthly report states that the general prospects of the mine are improving at almost all points, particularly in the two deepest levels. Fresh discoveries are daily expected to be made in the 40 and also in the 56, and the slopes are producing well. The mine is stated to be looking better than for a long time past.

Caron, 2 to 2½; the whole of the ponderous machinery is now on the spot and in course of erection, and, with fine weather, will be quickly finished. The appearance of the mine is greatly improved, and the lode continues to yield out productively, and with excellent indications of greatly increased riches when developed by deeper levels. Saint Harmon, 2½ to 3½; the report states that the discovery of lead in the bottom level still holds good, and the indications of further important discoveries are strong. In the south cross cut a small off-shoot from one of the lodes has been cut, and the appearance of the ground is greatly in favour of the main lode being soon intersected. The stratum is wet, an excellent indication, and it is believed that an important discovery is on the eve of being made. Red Rock, 1½ to 2½; the lode in the new discoveries continues to yield well, and the general appearance of the mine is better than ever. The slopes are all yielding well, and good reserves are being accumulated. South Cwmystwith, 3 to 4; satisfactory progress making in all works, and the prospects encouraging. Pateley Bridge, 2½ to 3; the Rake vein, in the 30 east, maintains its favourable appearance and productiveness, being still worth 4 tons of lead ore per fathom, and with every appearance of continuance. Other parts of the mine unchanged, and looking well. West Pateley, 2 to 2½; the Craven Cross vein, under the 56, is worth 1 ton of lead ore per fathom. Other points without special change. The machinery is in good working order, and the manager hopes to commence smelting another parcel of ore next week.

Subjoined are the closing quotations:—

Asheaton, 3½ to 1½; Carn Brea, 38 to 40; Devon Great Consols, 2½ to 2¾; Dolcoath, 29 to 31; East Caradon, 3½ to 3¾; East Van, 4½ to 5; Glyn, 5½ to 7½; Glenroy, 3½ to 1; Great Laxey, 18 to 20; Hingston Down, 3½ to 4½; Leadhills, 2½ to 4½; Marke Valley, 3½ to 4½; Parys Mountain, 8s. to 10s.; Pateley Bridge, 3 to 3½; Penstruthal, 3½ to 4½; Roman, 18 to 20; Tyn-y-Fron, 1½ to 1¾; West Asherton, 1½ to 1¾; Tyn-y-Fron, 1½ to 1¾; Tyn-y-Fron, 1½ to 1¾; West Asherton, 1½ to 1¾; West Chiverton, 7 to 9; West Pateley, 2 to 2½; West Tankerville, 3½ to 4½; Wheal Peacor, 6 to 6½; Wheal Grenville, 3 to 3½; Almada and Tiritio, 3-16ths to 5-16ths; Argentine, 3½ to 3¾; Birdseye Creek, 3½ to 1; Blue Tent, 3½ to 3¾; Cape Copper, 29 to 31; Cedar Creek, 3½ to 3¾; Chontales, 10s. to 12s.; Colorado Terrible, 2½ to 3½; Don Pedro, 3½ to 4½; Eberhardt and Aurora, 6½ to 6¾; Exchequer, 1-16th to 3-16ths; Flagstaff, 17s. 6d. to 18s.; Frontino and Bolivia, 1½ to 1¾; Hultafall, 4 to 5; I.C.L., 5½ to 6½; Javal, 3½ to 3¾; Kapanaga, 3½ to 4½; Last Chance, 1½ to 1¾; New Quebrada, 1½ to 1¾; New Zealand Kapanaga, 3 to 5; Oregón (pref.), 4 to 4½; Pestarena, 3-16ths to 5-16ths; Pumas Eureka, 2½ to 2¾; Port Phillip, 10s. to 12s.; Richmond Consolidated, 8½ to 9; St. John del Rey, 305 to 315; Sierra Buttes, 1½ to 2; South Aurora, 1½ to 1¾; Tecoma, 3½ to 3¾; United Mexican, 2½ to 2¾.

COLLIERIES.—An improved tone has characterised the market for these shares, and has brought in buyers who have hitherto been holding back their orders. Consequently prices are firmer, and in some cases higher. A general consideration of the condition of the coal and iron trades appears to justify this growing confidence. A great deal has been said and written on the subject of the result of foreign competition by which, according to some pessimists, England was rapidly being driven from markets in which once she had no competitors. These peeling prophets told us that Belgium, France, Germany, in fact all Europe, and America too, were already up many rungs of the ladder, and would soon reach the pinnacle of wealth which England had failed, and that nothing remained for us but to accept our fate with resignation. No one doubts, or can doubt, that continental and foreign producers have at times pushed us hard, but England's pre-eminence has not been lost, nor have English manufacturers suffered one whit more from bad trade than have their competitors. One recent case may illustrate this. Numerous tenders from English and continental makers were lately sent in for 900 tons of Bessemer rails for the Roman Railway, and the contract was secured by Bolckow, Vaughan, and Co., at 12s. 9d. per ton lower than the tender of the Belgian company of Cockerill and Co. Our exports of coal, too, which if we were losing our prestige, ought to fall off, are on the other hand increasing in quantity, the exports for the first four months of this year, exclusive of fuel used by shipping engaged in foreign trade, having been 4,484,343 tons, as compared with 4,309,509 tons for the corresponding period of 1877. Our iron and steel works, more especially the latter, are a great deal more busy than they have been, and in short there can be no doubt that a marked revival of trade has commenced, and if the present peaceful anticipations should be realised our commerce is in a fair way towards attaining its old proportions. South Wales, as might have been expected from the appearance with resignation. No one doubts, or can doubt, that continental and foreign producers have at times pushed us hard, but England's pre-eminence has not been lost, nor have English manufacturers suffered one whit more from bad trade than have their competitors. One recent case may illustrate this. Numerous tenders from English and continental makers were lately sent in for 900 tons of Bessemer rails for the Roman Railway, and the contract was secured by Bolckow, Vaughan, and Co., at 12s. 9d. per ton lower than the tender of the Belgian company of Cockerill and Co. 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Notices to Correspondents.

CHLORIDE OF ZINC.—Will your correspondent communicate with me on this subject?—CHARLES BOUNDY: Ripley, Derbyshire, May 22.

OLDHAM BOILER FLUID.—In answer to several correspondents, we may state that at present we have no further information than has already appeared in the Journal.

Received.—"W. S. K." (San Francisco)—"H. S." (San Francisco)—"H. D." (Paris)—"N. F. D." (Hull): We do not know the name or address of the vendor of the Oldham Boiler Fluid—"W. T." (Ballydeob)—"W. S." (Ulverston)—"T. L." (Newcastle)—"R. W." (Guildford)—"Fitz" (Bath)—"R. C. D." (St. Austell)—"T. P." (Wadebridge): The letter has been forwarded—"Adventurer" (Australian Mines) must sign his name to his letter—"G. P." (Starcross): We received the pamphlet referred to.

THE MINING JOURNAL,

Railway and Commercial Gazette.

LONDON, MAY 25, 1878.

EXPLOSIONS IN COLLIERIES, AND THEIR CAUSE.

We have been accustomed to look upon explosions in collieries as the result of the ignition of accumulated gas, or fire-damp as it is termed, by means of a naked light or by blasting with gunpowder. But there is now no doubt but what there are other agencies at work in mines unlooked for, and almost unknown, to many managers of collieries, by which explosions may, and in all probability have, taken place. At times large quantities of gas are liberated by the miner whilst engaged in bringing down coal, and whilst all ordinary precautions are taken to render it harmless by dilution with pure air yet it explodes, not only sacrificing life but destroying property as well, and despite the efforts of the most scientific and practical mining engineers they have been unable to say what was actually the cause of the catastrophe. Inquiries, however, have taken place, and experiments made with a view to seeing whether explosions may not have resulted from other causes than those to which they have generally been attributed, and a short time since Mr. D. P. MORRISON, of Newcastle-on-Tyne, read before the Derbyshire Institute of Mining and Mechanical Engineers a most valuable paper on the effect of coal dust in connection with colliery explosions, and we are informed that during the present week that gentleman has been engaged in making experiments, and intends continuing them, so as to elucidate in every way the important subject he has taken in hand. The result of these experiments, so important as they must be to the owners and managers of mines, we hope, through the kindness of Mr. MORRISON, to be able to place before our readers. In the meantime, however, we may say that some time since the subject was noticed and dilated upon by Mr. JAMES WILSON, the present chief of the Oaks Colliery, who has had great experience in connection with explosions in collieries, and who may be looked upon as an authority on all that relates to those terrible scourges which so frequently visit coal mines in almost every part of the kingdom. He tells us that in dusty pits, like many of those in the South Yorkshire district, the small particles of coal greatly impede the ventilation, and that he has every reason to believe that more men have been killed by the dust in a dry pit after an explosion has taken place than the managers have thought of. He states that he has noticed after an explosion has taken place that when the men and boys have been brought out alive or dead their noses and ears were filled with dust, from which many of them in all probability were suffocated. The fine coal dust when lighted by a shot is seen to burn almost as rapidly as gunpowder, whilst the fire after an explosion, which is always the most serious in a dry colliery, has generally been caused by the lighting of the coal dust. Is it then not probable, Mr. WILSON says, that a lamp in a very dry and dusty place may be so impregnated with the finer particles of coal that the latter will catch fire, and then extend to any gas that may be near to it?

The suggestion here made appears to be one that is well worth considering and practically testing by colliery managers, and, in our opinion, we think it would be shown that fine coal dust can be very easily ignited when it has accumulated to any extent in and around an ordinary safety or other lamp. Fire-damp we know, being so much lighter than the air, ascends to the top or roof of a mine, but in many instances it comes from the floor in very large quantities, and in so doing will pass over lamps, that from the inward and outward dust, may be ready to cause a flame that would readily result in an explosion. It is the same after the concussion caused by the discharging of a shot, or after a heavy fall of coal, for then the small particles surround the lamp, so that the dust can be readily ignited. That the fine coal dust lights readily and burns something like gunpowder we have evidence in our own houses, for if it is put into a red-hot fire in small quantities it blazes up very rapidly. That this dust is a dangerous element in a colliery is plainly shown in many ways. At the Oaks, as well as at some other collieries that are very dry, the roads are regularly watered, otherwise there would be considerable interruption to the ventilation, and such as might lead to serious consequences.

In thus briefly noticing what may be proved to be one of the causes of explosions, we do so in the hope that it will receive the attention of our colliery managers and mining experts, and who by their researches and experiments may be able to throw a good deal of light upon a subject which has not received much consideration from those who are most interested in it. We shall endeavour to obtain the results of the investigation now being made, as well as those that other persons may be induced to commence, for we feel sure that no more important branch of mining can be taken up, and if possible exhausted, than that relating to the different causes of explosions in collieries.

THE VIEILLE MONTAGNE.

The Vieille Montagne Zinc Mines and Foundries Company is one of the most famous industrial enterprises in Europe. The council of administration has just reported progress for 1877, and tolerably good progress it appears to be. In addressing the proprietors in April, 1877, the directors expressed apprehensions that the political complications arising out of the Eastern Question, in aggravating the commercial crisis, would exert an unhappy influence upon the company's affairs last year. These apprehensions have happily, however, not been justified by the actual facts. It is true that the value of rough zinc experienced all through 1877 an almost constant depreciation; but the company was enabled to deal with the consequences associated with this depreciation—first, by an increase in the production, which the good commercial organisation at the command of the management enabled the company to readily dispose of; and secondly, by a reduction effected in the cost of production through the fall in the price of fuel and minerals and the general progress realised in the management of the works. The net profits of 1877 accordingly not only equalled but even exceeded those of 1876, and this favourable result enabled the company to attain the object at which it has been aiming for four years—the liberation of the company from its terminable debt, amounting to about 240,000*l.* At the same time, the council of administration is enabled to recommend a dividend for 1877 at the rate of 12*s.* per tenth share.

The mines of the company are for the most part in full development. Explorations which have been perseveringly and continuously pursued in the southern portion of the great Moresnet bearing have still continued comparatively fruitless and unprofitable, but an interesting discovery made in a concession in the neighbourhood of Fossey, favourable results obtained in connection with the Schmalgraf Mine, and a reconnaissance pushed actively forward at Welkenraedt and Heggelsbruck render this group of bearings seriously valuable to the company. The mines of the Bensberg district continue to increase their production of galena and blende. Great pits which have been sunk in the centre of the fine mines of Castor and Ludrich seem to assure them a longer future, and the

new mines of Julien and Neu-Moresnet, which are about to become productive, replace bearings like that of Apfel, the future of which appears to be somewhat limited and restricted. The company's mines in Sweden have effected this year the largest production which they have ever attained, and if the depreciation of the metal produced by the company had not reduced the value of the minerals extracted by it the intrinsic profit of the workings would have been very satisfactory. The company's mines in Algeria have become productive, and the engineers who were directing them are devoting their attention to some interesting experiments as to the best means of utilising the antimony and lead which are found mixed with the calamines worked at Hammam. Some mines in Sardinia in which the company has an interest produced last year some rather important quantities of minerals at a relatively favourable cost price; but the fall which has occurred in zinc still condemns these workings to comparative—and, in fact, almost entirely—negative results. The production of zinc minerals effected by the company last year was 68,095 tons, as compared with 54,569 tons in 1876. Lead minerals were produced in 1877 to the extent of 6833 tons, as compared with 5914 tons in 1876. The closing of the Valentin-Cocq Colliery and the reduction to a minimum of the production of the Baldaz-Laloue workings explain a decline in the company's coal extraction from 78,100 tons in 1876 to 55,499 tons in 1877. The production of zinc effected at the company's foundries amounted last year to 43,238 tons; in 1876 the corresponding production did not exceed 38,518 tons. The rolling mills of the company easily produced 35,987 tons last year. The production of zinc-white effected in 1877 was 5689 tons. These totals are the largest ever attained by the company in any one year.

THE WALLING AND TUBBING OF MINE SHAFTS.

Extensive as has been the information given to the mining body by our ablest engineers and others, in the shape of books, essays, papers, and lectures, as to the best means of ventilating and safely working mines, not so much attention appears to have been paid to the sinking of shafts as we think the subject deserves. Shaft-sinking is undoubtedly the most expensive, as it is also the work that requires the longest time and the greatest care, in the opening of a mine and the winning of the mineral. The system generally adopted in this country has certainly not made that progress which might have been expected, for, whilst we do the work by hand, our neighbours on the Continent have been sinking shafts of considerable diameter by machinery. Still, in whatever way a shaft is being sunk, there are many things that have to be pondered over and thoughtfully considered by those who have the superintendence of the work. In the first place, it is essential that the person lying out a mine should be thoroughly acquainted with the strata on the surface, as well as that below at varying depths, so as to keep clear of faults and avoid feeders of water. Much judgment, too, is required as to the position of the winding shaft, so as to bring the mineral to the surface in the most economical manner and in the best marketable condition. Where it can be done, the best plan is to have the shaft to the "dip" of the entire area of ground to be worked, so as to obtain a long level course, but the proximity of the line of railway has also to be taken into consideration. In some of the metalliferous mines of Cornwall shafts have been expeditiously sunk by commencing at three or four places simultaneously, by levels or cross-cuts driven out of the working in the lode, the centre of the shaft being determined at each point by survey, a bore hole being made when the junctions get close. But this, of course could not be done in sinking shafts for the winning of coal, more particularly at great depths. But deep shafts for getting coal are of comparatively modern dates, and within the present century, for we find in "The Complete Colliery," written in the early part of the last century, that there were pits so deep "as 30, 40, or even 60 fathoms," whilst the diameter was generally not more than 6 ft., but now we have collieries with shafts from 600 to 815 ft. in depth, and of diameters ranging from 16 to 20 ft. Sinking these shallow shafts must have been comparatively easy work to what it is now, when vast bodies of water, as well as gas, have to be encountered and overcome. Shafts are now walled with either brick or stone, as may be the most convenient and cheapest. If with bricks, they are generally made of a wedge shape, in conformity with the circle of the pit, and if of stone the latter is dressed so as to fit in regular courses, the ends being tapered; but either way the walling is put in with good lime firmly backed up. In the lining of shafts where a large quantity of water has to be dammed back, and the pressure considerable, then metal tubing is necessary to effectually keep it back. Each segment of iron usually has a hole in the centre about an inch in diameter, which not only lets the water out as the tubing is being built up, but also answers well for letting the tubing down into the pit. After the tubing has been put in and secured, it is brought up close to the surface, and is wedged tight until no water exudes from it. In metal tubing it is necessary to have it carefully examined, so that no segments shall be used that have flaws, or are any way deteriorated, for not so long since we saw many tons at one colliery that was being sunk put on side because it was not up to the mark. It might be that a deficient casting where the pressure of water was very great might give way, and so down the colliery, as has been known to be the case. There is also another thing to be guarded against in connection with iron tubing. In up-cast shafts it is necessary to take precautions against the corrosion by the sulphurous acid contained in the smoke, which, on being absorbed by the moisture of the shaft, and trickling down corrodes the iron in a remarkable manner, at times nearly separating the iron from the carbon, so that the substance becomes so soft that it can be cut with a knife. A segment of tubing so weakened might not only do great damage to the property, but imperil the lives of men as well. But the tubing can be preserved from this taking place in several ways; a lining of wood—say, 2-in. thick deals, properly bevelled to the circle of the pit, and fastened by means of copper nails to the tubing, and driven into the sheathing or plugs contained in each segment. This will be effectual in preventing any accident by the weakness of the iron tubing. If of brick or stone, wood can also be successfully adopted. In some instances permanent timbering and wood or plank tubing is carried out; metal tubing is, however, considered the safest, and where water has to be kept back there is no doubt but what in the long run it will be found the most economical. In sinking through shifting sand piling is usually adopted; but iron cylinders heavily weighted, so as to sink down when the sand has been removed from them, has been successfully used. But in piling it is necessary to commence at the surface with a circle, the diameter diminishing (say) 18 in. for every 2 fms. sunk, so as to allow the cribs at the bottom of the lowest piling to be the same size as they would have been from the surface if ordinary crib timbering had been sufficient.

The importance of the subject it appears has not been overlooked in some influential quarters, for we find the President of the Midland Institute of Mining Engineers at the recent meeting giving some suggestions from practical experience as to the best means for obtaining the least amount of leakage in iron tubing without having recourse to the usual expense of wedging the joints of the segments, and in the case of stone or brick tubing that there should be no failure at the joints. In one trial made many years ago in a shaft 6 feet 6 inches in diameter, the material used being ashlar stone 8 inches on the bed dressed in front of the circles of the pit, and the courses laid in Roman cement mixed with sand. In a second and more recent trial in a shaft 10 feet 6 inches in diameter the ashlar was 9 feet on the bed, prepared as in the first trial, whilst the feeder of water at the shaft gave off at the rate of about 500 gallons per minute. Holes were drilled in the course of stone, so that the water passed down the sides of the pit above the work as it proceeded and behind the stone wall, and issued from the holes below the scaffold. As the building of the tubing advanced the holes in the stones below the scaffold were plugged up, and the water allowed to rise to the upper holes. The same system was adopted where cast iron was used. In a recent instance cast-iron tubing was put into two shafts, one 12 feet and the other 17 feet in diameter, when the wedging cribs were placed in the usual manner, sheeting being placed between the vertical and horizontal joints,

back wedges being driven behind. The holes in the segments were plugged, as many holes being left open as would discharge the water below the scaffold. The novelty in these trials consisted in filling the open space between the back of the tubing and the sides of the shaft with soil kept free from stones. When finished the lengths of stone tubing were quite dry, there not being the slightest leakage from the joints or the face of the stone. The cast-iron tubing in the two shafts alluded to were similarly backed with prepared soil, and the vertical joints partly wedged so as to render the bearing of the segments on each other more equal. A good deal of the soil passed from each shaft, especially from the 17 feet one, through large fissures in the strata to the intermediate or pumping shaft, and brought to the delivery and to the surface by the pumps, but by keeping up the height of the soil behind the tubing the fissures got blocked up, and the water pump was as clear as usual. The state of the soil was afterwards tested by boring out the wooden plugs, and was found to be quite dry and solid, and by thrusting in a prickler there were only slight signs of moisture, whilst on the withdrawal of the prickler the whole at once made itself up perfectly tight again. We have here clearly shown the value of fine dry soil as a backing for tubing, which has not been generally known or adopted, so that the importance of such tests as those made by Mr. EMBLETON cannot be overestimated in the sinking of shafts. They have also the great advantage of costing but little time or money, at the same time being most effectual. But there are conditions in carrying out the views of Mr. EMBLETON that must not be overlooked. In using the soil it is necessary that it should be moderately dry, so that it will not form lumps, but be in a powdery state, and in order that any vegetable matter may float on the surface of the water it is necessary that the soil should be poured into the water. Thus gradually the soil falls through the water, and becomes a solid mass, increasing in solidity according to its height, whilst the particles of soil by the pressure of the superincumbent water are driven into every crevice of the tubing and the strata as well. By this means the segments are better supported from behind than by the filling the space between the tubing and the sides of the shaft with broken stones. Should the quality of the water be such as to dissolve the substance of the tubing the soil will be a better protection than allowing the iron to remain in contact with such water, as would be the case when the backing is of broken stones. Here we have a simple agent of no actual value worth speaking about capable of performing a most important work in connection with sinking operations, and well calculated to prevent in many instances very serious loss from outbursts of water. As there is much yet to be added to our knowledge with respect to the most economical, rapid, and safest mode of sinking it is to be hoped that greater interest will be shown in the matter, and that we shall have to record other equally simple, practical, and valuable suggestions on the subject as the results of the investigations of our mining engineers.

INSPECTION OF EXPLOSIVES.

The second annual report of H.M. Inspectors of Explosives—that for 1877—has just been issued, and Majors MAJENDIE and FORD may be congratulated upon having a smaller number of deaths and no increase in the number of injuries. From the details given in the report it is difficult to show the relative danger of manufacture—that is, the number of tons made for each life lost, or the number of deaths for each 100 workpeople employed—and equally difficult to ascertain the relative danger of the several explosives in the hands of those using them. Perhaps at some future time the Inspectors will be empowered to make closer investigations. Summarising the accidents for 1876 and 1877, according to the explosives by which they were occasioned, we find:—

Nature of explosive.	1876.			1877.		
	Accidents.	Deaths.	Injuries.	Accidents.	Deaths.	Injuries.
Gunpowder	32	14	14	37	11	18
Dynamite	5	26	10	11	7	10
Tonite or cotton powder	5	3	12	5*	2	7
Lithofracture	1	—	1	—	—	—
Patent gunpowder	1	—	—	—	—	—
Fulminate	3	1	—	8	—	5
Schultze gunpowder	—	—	—	2	1	5
Detonators	1	1	—	2	3	—
Fireworks	7	5	sev.	1	—	1
Miscellaneous	4	—	2	—	—	—
Total	59	50	39	68	24	45

* It is not certain that one of these was not occasioned by dynamite.

After noticing the favourable comparison of the list for 1877 with that of 1876, the Inspectors remark that even as regards the number of accidents which appears as slightly greater than in 1876, the excess is to be accounted for in a great degree by the fact that their sources of information with regard to the occurrence of accidents are now more numerous and reliable than they were in the first year of the Act coming into operation, and it is more generally understood by the trade that every accident by fire or explosion in a factory, whether or not causing loss of life or personal injury, is to be reported; thus, out of the 37 gunpowder accidents no less than 17 were explosions of incorporating mills, a class of accident which not only in magnitude but in kind differs materially from an accident in a press-house or similar building, and which, owing to the recognition of the fact that the occasional explosion of incorporating mills is almost unavoidable, and to the resulting precautions adopted for excluding the workpeople as much as possible from the mills while they are at work, comparatively rarely leads to loss of life or personal injury. Again, the accidents with cap composition, of which eight are reported during the year, were in no case attended with serious results, the five persons who were injured thereby having been only very slightly burned. These accidents also are probably more or less unavoidable, and all that can be done is to prevent as far as possible any serious injury resulting from them; consequently the slight augmentation in the number of accidents is not in itself a source of discouragement, but may rather be accepted as an indication that this department now receives more complete information of accidents, small and great, than it has received before; and, turning to the effects of these accidents, the result is distinctly satisfactory.

The report refers very prominently to an accident with dynamite at the Penn Rieca Slate Quarry on April 13, 1877, by which one man was killed and one injured, and a similar accident at the Cwmbarn Colliery in August, by which two men were injured, are interesting, as illustrating a danger in connection with the use of dynamite in wet ground which is too commonly overlooked, but which has on more than one previous occasion led to accidents. In both these instances the explosion was caused by a man boring a fresh blast-hole in the neighbourhood of a hole in which dynamite had been deposited a few days previously and which had not exploded, but at some little distance from it, and in so boring he struck upon some nitroglycerine which through the action of wet had exuded and had worked through crevices in the slate or intervening ground to the point (and perhaps beyond it) at which the boring tool came into contact with it. In the Penn Rieca case the jury recommended "that the Dynamite Company should inform parties of the danger of nitroglycerine exuding from dynamite in wet holes and holes tainted with water." In consequence of the former of these accidents the company was communicated with by the Home Department, and they undertook to add to the instructions issued by them to their customers a warning about misfires to meet circumstances such as those which arose in this case. It is the Inspectors' thanks to be regarded that notwithstanding these and similar accidents, and notwithstanding the pointed manner in which the attention of Nobel's Explosive Company has been called to this defect, and notwithstanding the yet more formidable experience of the Hamilton explosion of 1876, and the careful manner in which the legislation relating to dynamite has surrounded it with precautions to keep it from contact with moisture, it is, we say, to be regretted, that notwithstanding all this the company should continue, as they appear to have done down to the present time, to advertise in the

mining journals that dynamite is "unaffected by damp." Such statements are not only untrue, but are dangerously misleading, and they would be ill-discharging their duty did they not take such opportunities as are afforded of officially protesting against them.

Their general experience of the working of the Act is decidedly satisfactory, and if the Act had to be redrawn would find it difficult to suggest in what fundamental particulars it could be altered or improved. This conclusion is approved by the greatly extended experience acquired during a second year's working of the Act. It also holds good now, as then, although in a sensibly diminishing degree, that the weak point in the actual operation of the Act is the inaction in so many instances of the local authority. The difficulties arising out of the, as they venture to think, unavoidable length and highly technical character of the Act have been materially relieved by the publication of the Official Guide Book, with the assistance of which they believe that any person of ordinary intelligence and application can comparatively readily master the details of the law. The evils and difficulties which it was anticipated by some of the trade would result from the Act have, so far as their observation goes, been avoided, or have gradually disappeared as the Act has been got into better working order, and as its provisions have become more generally understood, and they have much satisfaction in stating that they at present are unable to point to any substantial obstacle to the successful operation of the Act, other than the inaction in many cases of the local authorities; and this single difficulty is one of continually decreasing proportions, towards the reduction of which much has been effected during the past year, and of which they think it not unreasonable to anticipate an approximately complete solution at no distant date.

PORTABLE IRON BUILDINGS.—Upon the first establishment of mining works in unsettled countries it is frequently desirable to erect buildings capable of easy removal, and much annoying loss has frequently resulted from permanent works being put up in positions subsequently found to be inappropriate. The portable corrugated iron buildings invented by Mr. ISAAC DIXON, of the Windsor Ironworks, Liverpool, will probably be a complete remedy for these difficulties. His invention is designed for a light cheap covering to be run up in an hour if necessary, and taken down in an equally short space of time. It consists in forming the building of a simple arch of corrugated iron with flat ends of the like material, but without any framing. The ends pieces can be flanged over the arch, and bolted with one or more bolts. The door or doors can be of corrugated iron likewise, and in the end or ends; in very long buildings, however, they can be cut in the arch also to open outwardly. These doors are hinged to a stronger piece of corrugated iron round the doorway, forming the door frame or substitute therefore. An iron eye or loop can be rivetted or bolted to one side to put a peg in to keep the door closed. In erecting he usually lets the bottoms of the arch into a small trench on each side, and as an extra precaution occasionally hold the arch down by wire rope. Lighting and ventilating holes can be placed in the roof or axis of the arch at intervals, and the windows can be of glass, horn, mica, gelatine, or other tough transparent material.

STEEL AND WROUGHT-IRON PROJECTILES.—Experiments are to be resumed at Shoeburyness for the purpose of gaining information as to the penetrative power of steel and wrought-iron projectiles, and the resistance of specially prepared targets. Some of the results already obtained have produced most unexpected and surprising experiences, the most remarkable being found during a trial of a composite steel and iron target. When fired against the steel face of the target the projectiles broke up badly, but when the target was reversed the shot not only penetrated the softer wrought-iron, but went clean through the steel as well. This is theoretically accounted for by the supposition that in passing through the wrought-iron the metal of the projectile gets set up into a more compact body, and is, therefore, better able to endure the shock of the heavier impact. This discovery, if it be a discovery, is to be further investigated, and in order to test it in the opposite direction a steel projectile with a wrought-iron face upon it has been made at the Royal Laboratory Department, Royal Arsenal, Woolwich, and sent to Shoeburyness this week.

IRON BRIDGES IN AMERICA.—In a paper read at the Institute of Civil Engineers, Mr. T. C. Clarke, of Philadelphia, stated that the Ohio Bridge consisted entirely of rolled iron, pin-connected. The girders were quadrangular, each 5½ ft. deep, the panels being 25½ ft. long, and girders 20 ft. apart from centre to centre. The weight of iron in the span of 515 ft. was 1176 tons. With a total load of 431 tons, the centre deflection of the east truss was 23.32 in., with a permanent set of 1.16 in., that of the west truss being 2 in., with no permanent set. The Kentucky River Bridge occupied four months and four days in erection, the average number of workmen employed being 53. The average cost of erection was about 2½ 10s. per ton. The weight of iron in the bridge 3,654,271½ lbs. The depth of the truss was 37½ ft., and its width was 18 ft. The iron pier at the base was 28 ft. by 7½ ft.; at the top it was 1 ft. by 18 ft.; and it was 177½ ft. high. This was one of the boldest and most original pieces of bridge engineering in America. The workmanship of long long-span bridges in the United States was generally first-class; and that the price of American bridgework had fallen year by year, from 40s. 6s. per ton in 1870 to 20s. 16s. per ton in 1877.

VICTORIA (PHILOSOPHICAL) INSTITUTE.—A meeting of this society was held on Monday, at its house, Adelphi-terrace. Among the members elected several were resident in the United States and in the Colonies. A paper on Physical Geography was read by Mr. J. Thornhill Harrison, M. Inst., C.E., in which he gave a description of the various changes which had taken place in the position of the earth which had tended to produce its present state. A discussion ensued, in which several took part.

A STOCK EXCHANGE CASE.—A very important decision in respect of the liability of principals to brokers on the Stock Exchange was given in the Court of Exchequer at Westminster, on Monday, before Mr. Justice Lindley and a jury. The plaintiff, a stock broker, named William Ward, sued a person named Kettle to recover differences in respect of the sale and purchase of some thousands of North British Railway stock. Mr. Yelverton, instructed by Mr. Frederic Cliff, of Austinfrans, was counsel for the plaintiff, and Mr. Bowen and Mr. J. M. Mackenzie represented the defendant. In his opening Mr. Yelverton stated that the plaintiff had been employed by the defendant, through a Mr. De Horne, known to both parties, in the first instance, to sell and then to buy North British Railway stock, and the defendant not having the stock to deliver or paying for that bought the plaintiff gave notice to the defendant that he should sell to close the stock then open; and, further, that he should take steps to recover the differences which had accrued to the total of 108½ 19s. 7d. The plaintiff and several other witnesses were called, who proved the sale and purchase of the stock for the defendant. The learned counsel for the defence elicited in cross-examination that none of the stock bought or sold for any client introduced by De Horne was ever delivered or paid for, it was simply carried over, and he contended that De Horne, being the agent for both parties, the transaction, in respect of which the action had been brought, was simply a wagering contract upon the rise or the fall of the market. The defendant was called, who swore that De Horne came to him as the friend of the plaintiff, and suggested to him that the plaintiff should sell North British Railway stock for the fall. He never authorised or led the plaintiff to believe he desired to buy and sell *bona fide*. In defence the Gaming Act was relied upon. The plaintiff's counsel replied, and contended that there was ample evidence that the transactions were not voidable under the Gaming Act. He quoted *Rosewarne v. Billing* and other cases, and stated the question he would submit to the jury was—Did the plaintiff do the business for the defendant in accordance with the usual practice of the Stock Exchange? If they answered that question in the negative, it would then become a question of law for the Court whether the contracts were voidable at Statute Law.—His Lordship, in summing up, told the jury that they must, having heard both sides,

say whether or not the defendant had satisfied them that the plaintiff knew the transactions were gambling ones.—The jury answered this question in the negative, and judgment was thereupon given for the plaintiff, with costs.

NOTES FROM THE CLEVELAND DISTRICT.

Although trade in this district continues depressed, and without any hope of a speedy revival, there are signs of strong life discernable in the various branches of the iron trade. Ironstone mining, notwithstanding the decrease in the make of iron, continues to be vigorously prosecuted, and the make of pig iron, chiefly from Cleveland ore, yet reaches the respectable figure of 165,000 tons per month. Taking the iron rail trade as altogether dead, finished iron manufacturers are not in a hopeless condition. Messrs. Hopkins, Gilkes, and Co., who have only recently completed a large order for bowl chairs for an Indian railway, have secured a few days since for their Tees engine works an order for close upon 4000 tons of cast-iron water-pipes. This order has been given by the London and North-Western Railway Company. The weight of piping is equivalent in length to about 14 miles, and the order will occupy four months in execution. Messrs. Head, Wrightson, and Co., of Stockton, are now engaged upon bridge works for the Seville and Huerva Railway, in Spain, the largest bridge being intended to span the noble Guadalquivir river. Bridge building is a speciality of this firm, who employ about 1000 hands. While constructing a bridge to cross the River Sutlej, in India, a short time since, the firm being pressed for the completion of the contract, applied the electrical light to their premises, by means of which they were enabled to keep the work incessantly going, night and day. They obtained one of Siemens Brothers dynamo machines, and one of their patent lamps, the whole apparatus being able to produce a light equivalent to 1300 candles. The dynamo machine is driven by a belt from the shafting to the bridge yard, the adduction cylinder making 1100 revolutions per minute, and requiring about 1½-horse power to drive it. The lamp is placed in the required position within a short distance of the machine, and the intense light produced by the combustion of the carbon points is thrown forward by means of the reflector, the surfaces of which are lengthened so as to prevent dispersion of the light in any direction except that required for the complete illumination of the area in which the work is carried on. The success of the experiment was such as to induce Messrs. Head, Wrightson, and Co. to employ this method of lighting for all night work. Messrs. Blair and Co., of the Locomotive Engine Works, Stockton, have also adopted it. But of all branches of the iron industry that which appears to suffer least is iron shipbuilding. The yards on the Tees are well supplied with orders, and about 5000 hands are kept in brisk work.

On Saturday afternoon last Messrs. Raylton Dixon and Co. launched from the Cleveland dockyard a handsome iron screw steamer of 2250 tons gross register and 220-horse power nominal, for the Rotterdam Lloyd's mail line between Holland and Batavia. The dimensions of the vessel are—length 315 ft., breadth 36½ ft., depth 27 ft. She is classed 100 A 1 at Lloyd's, and is fitted with cabin accommodation for first-class passengers in a large deck-house specially arranged for good ventilation, and containing a large saloon panelled with polished marble. She is called the Gelderland, and is a sister ship to the Ousryssel, built by the same firm a short time ago. From the other yards two or three fine screw-steamer for the British merchant service have lately been completed, and several more are on the stocks. Messrs. Bolckow, Vaughan, and Co. (Limited) are finding ready markets for their steel rails made at the new steelworks at Eston. The ore employed is brought from the company's mines at Bilbao, in Spain, and from the Cumberland hematite mines. But the report which is most cheering for the district is the announcement that this firm are about to convert their forges and rail mills at Middlesbrough, which have been lying idle since the fall of 1875 into steelworks. On enquiry I ascertained that the report is well grounded, and that a large expenditure of capital will be made. So much are the firm in earnest that the old works are now being pulled up, and the new erections will be proceeded with without delay. When completed, not only will work be found for at least 500 hands, but the principle of adopting steel in place of iron as the staple trade of the district will receive a great impetus. There are rumours that a firm from Sheffield contemplate erecting works near Middlesbrough for the manufacture of important items of the steel trade, but on that point I will satisfy your readers in my next letter.

The products of the district are fairly well represented at the Paris Exhibition; but owing to the death of Mr. John Jones, the secretary of the various iron trade associations, the representation is not so complete as it otherwise would have been. A case devoted to the Cleveland Ironmasters' and Iron Manufacturers' Associations contains a pillar of ironstone, samples illustrating the manufacture of pig and finished iron, and also steel, and samples of the coke and lime-tons of the district. In this case Messrs. Stevenson, Jacques, and Co., of the Acklam Furnaces, exhibit castings of umbrella stands and various ingenious articles made direct from the furnaces. Mr. Thomas Whitwell, of the firm of Wm. Whitwell and Co. (Thornaby Furnaces), exhibits models, photographs, and drawings of the hot-blast stoves patented by him, and now in extensive use in Great Britain, France, Spain, Belgium, Luxembourg, Germany, Austria, the United States, and Japan. Specimens of Bessemer and other iron made at the Thornaby furnaces, where the hot-blast stoves are applied, are also exhibited. The first examples of the system were erected at Thornaby in 1867. The Consett Iron Company shortly followed, and have spent upwards of 30,000l. on the system in their own works. The Cumberland Smelting Company have also adopted these stoves, and have remodelled their entire plant within the last two or three years. Altogether about 80 iron making concerns are now using these stoves, and it is computed that in the last nine years a sum of 680,000l. has been spent upon them. If it would interest your readers, I should be glad to supply a full description of the construction and working of these stoves. The only remaining exhibit at Paris is one by Messrs. Head, Wrightson, and Co., of patent pulley blocks and hoists, varying in power from 10 tons to 10 cwt., which weights are all lifted direct without the intervention of a second pulley. This system of lifting is one which has during the last few years come into very extensive use, and a department of the exhibitors' works at South Stockton is exclusively devoted to the manufacture. On the iron market on Tuesday the selling price of No. 3 Cleveland pig was 39s.

REPORT FROM MONMOUTHSHIRE AND SOUTH WALES.

May 23.—Last week allusion was made to the fact that a number of men were charged at the local police court with having intimidated the new "hands" at the Bianelydach Colliery. Since then the men have been able to proceed to their work without interruption. As a rule the Welsh collier or ironworker is a law-abiding individual, and as a proof of that I need only revert to the conduct of the men during the great strike and lock-out. What a contrast was their behaviour then compared with what we have heard of as taking place of late in Lancashire. The distress in the district has to some extent abated. During the time it lasted in its intensity the Rector of Merthyr alone received in actual cash 4180l.; clothing and gifts in kind make up the large total of 7580l. Two colliers have been killed and another seriously injured by an accident which has occurred at No. 1 pit, belonging to the Aberdare Coal Company. The men were coming from their work in a tram drawn by horses. The wheel slipped off the plates and knocked against a couple of timbers. These came down, and a quantity of rubbish fell on the men. When an improvement is likely to take place in the Iron Trade no one seems bold enough to predict. Most of the works are badly off for orders, and to see activity prevailing at any establishment is the exception now-a-days. There are a few orders in hand, among others for India, New Brunswick, and Australia; but of late clearances have not been large. Some small parcels have been sent to Cronstadt and Valencia, as well as larger ones to St. John's (New Brunswick), and Sweden. Railway iron does not seem to be likely to secure a better demand, and the prices at which this

commodity has to be sold militate greatly against masters. Then, too, there is no briskness in the foreign demand for bars, and the effect of Belgian competition is much felt. Stocks of pigs are reported as large at several of the works. The men at the Oakfield Wireworks, near Newport, have received notice of an intention to terminate contracts, and this probably means a reduction in wages.

To turn to the steel industry, prospects here seem a little more satisfactory, and there is more activity observable than in the iron-making departments, as a rule; at the Rhymney Works a large quantity is turned out. With the present appliances here enough steel ingots can be turned out weekly for a make of 1000 tons of rails. The copper ore trade of Swansea continues depressed. There is a slight movement in the Tin-Plate Trade, which is apparently the result of the recent meeting at Swansea, yet another firm in the district has succumbed to the pressure of bad times and an unprofitable make.

The output of Coal continues large, and all qualities are generally abundant and cheap. The demand for steam coal keeps up fairly well; indeed, it is not so much the demand as the prices which are grumbled at. A large quantity of coal is weekly shipped to the Mediterranean, Cardiff sending away last week as much as about 45,000 tons. Considering the time of year, the demand for gas coals may be considered fairly good. The house coal pits are not quite so well employed, and the demand is quiet. The patent fuel trade is also dull.

Our Swansea correspondent writes—"The trade of the port continues fairly brisk. The quantity of coal exported is larger by some 900 tons than that shipped last week. Patent fuel trade quiet. The tin-plate works are still going full time, and will continue to do so until June 29, when the make will be reduced in accordance with the resolution passed at the meeting of manufacturers held here a short time since. Copper ore trade dull. At the Ticketing on Tuesday 2621 tons only were sold, realising 10,541l.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

May 23.—The condition of the coal and iron trades is not more favourable than it was a week ago. So small is the demand for coal that notwithstanding the limited output owners are talking of the advisability of entering into an arrangement for still further curtailing it, but it is unlikely that any action binding upon the whole body could be successfully adopted. Underselling is more than ever prevalent, and every contract in the market is eagerly contested for. Pig-iron makers are going through a bad time in respect of both demand and prices. Only about 45 furnaces are blowing, which leaves over one hundred standing. Stocks are not much decreasing. Hot-blast all-mine pig is 4½ per ton; mixed ditto, 3½ 5s.; and cinder sorts, 2½ 3d. as a minimum. Finished iron buyers will not negotiate for forward delivery, and confine their purchases to the meeting of pressing necessities. For the making of this class of iron the Regent Ironworks, Bilston, have been restarted by Mr. Onions.

Interesting information as the prices of coal and iron during the past 36 years is conveyed in a diagram got out by Mr. Walter E. Wood, iron merchant, Stourbridge. For three years—from 1842 to 1844 inclusive—furnace coal stood at the same price—6s., and in 1873 reached its maximum—19s. Slack was at its minimum in 1849 and three following years—2s. 6d., and its maximum price was 10s. 6d. in 1873. At the present time coal stands at 9s. and slack at 4s. 6d. The lowest point that marked bars touched was 5½ in 1843, and it was in this year that the iron and coal masters petitioned the Government for aid when best all-mine pig was selling at about 2½ 10s. The highest price that bars attained was 16l. in 1872 and 1873.

The colliers throughout South Staffordshire, as a whole, are working with regularity, and are not giving their masters much trouble; indeed, many of them would be glad to do more work than can be found for them. A considerable number of the men who have been on strike at the East Cannock Colliery have returned to work. The shallow mine is chiefly affording employment for them, as the deep workings of the colliery are at a stand, owing in much part to the want of demand.

A meeting of the John Bagnall Company (Limited) was held in Birmingham, on Tuesday. The committee appointed to prepare a report as to the proposed reconstruction scheme had not yet, it was announced, completed their investigation, and the meeting was adjourned.

The stocks of coal in North Staffordshire are accumulating on the pit banks, although the output has been largely reduced, and most of the colliers put on short time. Prices are very low, still the demand is so limited that a fall in quotations is not unlikely. Unless trade revives some of the pits will probably shortly confine operations to one or two days a week; nevertheless, the Chatterley Iron Company are about to reopen a pit. The iron trade remains dull.

At the annual Conference of the National Federation of Engineers, held at Hanley last week, it was stated that the society now comprises about 3000 members, and the report showed that, as a whole, the organisation was making fair progress. At a public meeting held in connection with the conference a resolution was passed that no person ought to be allowed to take charge of either steam-engine or a boiler until he had obtained a certificate of competency from a board of examiners.

The arbitrators under the South Staffordshire Mines Drainage Act have just officially confirmed the award for a mines drainage rate for the Tipton district, which shall not exceed 9d. per ton on all the ironstone mined, 6d. per ton on coal and slack, and 3d. per ton on fireclay and limestone. The new graduations recently allowed by the Commissioners, on appeal, at their public sitting, are confirmed. The award is now binding upon the Commissioners, and upon all mineowners and occupiers liable to pay rates in the Tipton district.

REPORT FROM CORNWALL.

May 23.—It is anything but pleasant to find that week after week we have nothing to record concerning the condition and prospects of the tin market than that matters continue practically unchanged, with the standards at the lowest point within memory. There are, it is true, a few minor fluctuations, but they are of very trifling importance, and hardly serve to vary the dead level of monotony to which we seem doomed. As to the prospects, they continue in like manner precisely what they were. Everything by common consent is held to depend upon the course which affairs take in regard to the Eastern Question, but the relations in that quarter have too long been strained to allow of a beneficial influence coming from anything but a definite settlement, and as to the prospects of that, he would be a very bold man who would venture to make any certain prediction.

Some comments have been made upon the fact which we recently pointed out of the singular manner in which our mines have adapted themselves to altered circumstances, as regards improvement and economy of working. The depression has come on gradually, and the mines have accustomed themselves to cope with it, and, as we said, they are better able now to make profits with tin 20s., or in some cases 30s., below what used to be considered the regular and normal rates than they were then. This appears in some quarters to have been thought too favourable a view of the present aspect of affairs, but, if proof were needed, what better could we have than that supplied by Botallack, certainly not the least expensive mine to work in Cornwall, and yet making a loss of 47l. on the quarter only. Why, such a result would have been deemed the wildest nonsense if predicted half a dozen years ago, and the prophet treated as insane.

The foresight of those who regarded the unfortunate business at Devon Great Consols as by no means so easily settled as gentlemen at a distance appeared to think, has so far been amply verified by the result. Up to Saturday last only a part of the men whose bargains had previously expired, had dropped work. On that day the whole of the hands, even women and children, unanimously refused to continue on at the five-weeks month, and this great undertaking is not, so far as production is concerned, utterly idle. This proves very clearly that by those who consider themselves most nearly interested this is by no means regarded as an agent's question simply.

Had it been, instead of all hands dropping work on Saturday those already on strike would have returned; and that it is by no means an opposition merely to a reduction of wages is proved by the fact that such a reduction on the four-weeks system was cheerfully submitted to at Wheal Crebor. We shall now have an opportunity of ascertaining what amount of correctness there is in the assertion that there are a thousand miners in Cornwall ready to take the places of these men. Up to the present time none have come forward; on the contrary, the Cornish miners are now holding meetings, and raising subscriptions to the relief of their Devonshire brethren, for they regard the resistance to the five-weeks month as a matter in which they are deeply and personally concerned. And however matters may end, there will be room at Devon Consols for men from over the Tamar, for the Tavistock district is now rapidly losing almost day by day some of the best men, who are seeking and obtaining work in other directions elsewhere. It is very satisfactory to contrast the behaviour of the Western miners with that of the Northern mill operatives. While the latter are rioting and wrecking mills, the former have resolved that pending the annual meeting of shareholders all engine-men, shaftmen, and others in charge of pitwork, &c., shall remain on, so that the mines should not be flooded. Everything now depends upon the meeting of shareholders; but the directors would show their wisdom if they were ready to acknowledge that they had made a blunder from want of adequate local knowledge, and had endeavoured to attain a necessary end in what they have certainly, so far, found an impracticable way. From a pecuniary point of view in the reduction of the salaries of the agents, &c., they must already have secured the economy they desired, if no general reduction of wages was really in view.

There ought to be some interesting details concerning the china-clay trade to come by-and-by out of the bankruptcy of Capt. David Cock. According to him at his recent examination, five or six years ago he started in business with a capital of 2000, or 3000. He has now failed for 21,854, and his assets are but 2635. This result is set down practically to losses on clayworks, but in one sense it was certainly primarily due to the facility with which money was obtained by discounting through bankers. Of course the latter have now to suffer, and to a pretty heavy figure, but what basis was there even for Capt. Cock's going into business on such a scale at all? No wonder we get depression and crisis when speculation is conducted in such a risky fashion.

There has been a good deal of amusement caused by the circular which Mr. Bennetts has issued with regard to Mr. Rule. It is another version of the old proverb, "Physician heal thyself," for assuredly if Mr. Bennetts can establish his charges he will be regarded as doubly a reformer, in that he has taken in hand the reform of Mr. Rule, who has been so energetic in the reform of our mining system generally. This amusing side of the controversy was certainly particularly prominent, especially when the answer was delayed. However, there is a more serious side to the whole business, and a strict and thorough investigation is clearly called for, that the whole merits of the case may be made clear. Mere *ipse dixit* on one side or another will not suffice in such a matter.

TRADE OF THE TYNE AND WEAR.

May 22.—There is little new to notice in connection with the Coal and Iron Trades; on the whole, dullness generally continues to pervade everything; occasionally spurts or partial revivals occur, but those movements excite hopes only doomed to be speedily overthrown. Certainly large shipments of steam coal have been made lately, and most of the best steam coal works are still well employed, but many others only partially, and the demand for all second-class coals and for coke is very flat, and, as a natural consequence, the price continues low. There is no prospect at present of any of the works closed lately being reopened. A number of men are unemployed in the district, but this number is gradually being reduced by men removing to other districts and emigrating to other countries. In Durham the coal trade, on the whole, continues dull, and more works are likely to be stopped. At Brandon the colliery intended to be closed has to be continued in work, as the men have accepted a reduction of 10 per cent. in their wages.

There is a rumour that the British Government have ordered 200,000 tons of steam coal at Sunderland. Should this prove correct it will be very useful at present, as the prospect for the summer trade in Durham is far from cheering. At Eldon Colliery the strike continues, and only a few hands are now at work, as there was no prospect of a settlement, and the men refused to quit the houses they occupied; the work of ejecting them commenced on Tuesday, when about 50 houses were cleared. A large number of policemen are employed to protect the men employed at the works and those engaged in ejecting the men from their houses, and some rather rough encounters have taken place between the police and the men on strike. Disorderly crowds have collected, and stone throwing has been indulged in to some extent, causing some damage to the windows of the viewer's house, but a charge of the police, and the free use of their truncheons, has so far had the desired effect of dispersing the disorderly crowds. The Eldon Colliery is one of the finest works in South Durham; upwards of 600 men are employed, and the output of coal exceeds 1000 tons per day.

The iron market at Middlesbrough on Tuesday was scarcely so well attended as usual. Business throughout was very slack, and enquiries limited. Prices are rather weaker than last week, a difference in favour of buyers being presented of about 3d. per ton. The general quotation for No. 3, unless in exceptional cases, where more is asked, is 38s. 6d., less commission, but the real rate at which business is done is 38s. to 38s. 3d., less commission 1 per cent., f.o.b. Tees or on trucks. Forge iron, No. 4, is about 37s. 6d., less commission. The deliveries of pig-iron to Scotland from the Tees fell off by nearly 3000 tons last week, as compared with the previous week. Taking the year as far as it has gone, however, it compares favourably for Scotch consumption of Cleveland iron with the corresponding period of 1877. Up to last Saturday over 109,000 tons had been dispatched since the commencement of the year from Middlesbrough to Grangemouth. The trade done with Scotland is a very considerable feature in the pig-iron trade of the North of England. The continental shipments have been retarded, and are nothing like what they would be were confidence in the political aspect of affairs fully established. The iron manufacturers are tiding over the season as best they can. They are not getting much fresh work, as consumers do not give out orders for more than they are compelled to do. Thus orders for plates come in slowly. Bars have still an exceedingly restricted sale. In the foundry trade rather more animation prevails, as orders for pipes and railway chairs have been coming in. Hopkins, Gilkes, and Co., of Middlesbrough, have received orders for 14 miles of water pipes for the London and North-Western Railway Company. The engineering trades, though not so active as at the time since, are still fairly busy. The prices of manufactured iron are—Plates, 6l. 2s. 6d. to 6l. 5s.; common bars, 5l. 10s.; iron rails, 5l. 10s.; angle iron, 5l. 12s. 6d.—all less 2½ per cent. The steel rail works at Eston are very busy, turning out 1200 tons per week. The Coal and Coke Trades are dull, and prices are very low and unsatisfactory.

On Monday the ceremony of laying the first rail of the Street Tramways for Newcastle was performed by the daughter of the Mayor, in the presence of a large number of members of the Corporation and of the public. The formation of the tramways is in the hands of the Corporation, who have Parliamentary powers for the purpose, and the undertaking has been placed under the charge of the Town Improvement Committee. The scheme in its full extent is not completely matured, but we may state generally that it comprises what may be called a main line, extending on the west side of the town from the borough boundary on Scotswood Road to the boundary of the borough near Bulman village on the north side of the town. The line crosses the town moor by the North Road, with lateral branches to the village of Benwell on the west, to the Minories at Jesmond by way of Jesmond Road, and to Red Barns by way of New Bridge-street on the east. The work now commenced comprises the greatest portion of the scheme—the whole of the routes alluded to, with the exception of that to Benwell, and will extend over a distance of 6½ miles of streets, or, with the double

lines of rails required for cars passing each other at short distances throughout the route, the distance to be covered will embrace about 7½ miles of single rails. The rails are manufactured by the Ebbw Vale Iron Company, South Wales, and are rolled steel, weighing 50 lbs. per yard, in 24-ft. lengths, fixed upon cast-iron chairs weighing 49 lbs. each.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

May 23.—Some idea of the depressed condition of the coal trade may be gleaned from the fact that the collieries between the Dee and the Ceiriog are selling their Main coal at 5s. per ton, with 2½ off in a month. To anyone conversant with coal getting it will at once be seen that selling at this price entails a loss. Yet coal is loaded at some of the Staffordshire pits for Shropshire and North Wales at the same price. About 200 men from the Ruabon Coal Company's pits at Hafod-y-bwlch have been discharged, owing to a difference with the manager about time. This colliery is attaining an unenviable notoriety for disputes; the sacking of the manager's house by the men, some 18 months ago, will be remembered by the readers of the Journal. Some of the larger collieries are working a little better, owing to an excess of shipping orders, but the spurt is too recent and temporary to justify a hope for permanent improvement just yet.

I have read with great interest the lecture by Mr. Daniel Jones, F.G.S., and his friend, on the Spirorbis Limestone, as found in Staffordshire, which appeared in last week's Journal. This little, and little known, limestone is in itself a marvel. Extending from Scotland to South Stafford, and found in exactly the same position in Saxony and Nova Scotia, its origin deserves more attention and exposition at the hands of geologists. Occurring, too, as it does everywhere near the summit of the coal measures it naturally forms a good upper boundary line to that formation, and should be accepted as such by geologists, as suggested by Mr. D. C. Davies, F.G.S., of Oswestry, in the paper referred to by Mr. Jones in his lecture. There are one or two thin coals above it, one of which is worked in South Shropshire, otherwise all the workable coals lie below; above it for 230 yards, where they exist in their entirety, are the green conglomerates and purple marls of the lower and middle Permians. At this height in the north-west corner of Shropshire, at St. Martin's, are found three coal seams, two of which have been worked at Ifton and Flanog. This is the only locality in the British Isles where coal seams have been worked so high up in the Permians. Above these seams come the dark-red sandstone, according to how we regard them. The limestone should be looked for above the Mynddylwyn and Graigola coal seams in South Wales. Mr. Jones's paper is of interest also in affording us a glimpse of the section of the Sandwell Park Colliery.

Some four years ago I subscribed a guinea for a proposed volume explanatory of that sinking, but from then until now, although I have written repeatedly, I have not heard anything of my guinea or of the volume. Are any other readers of the Journal in a similar position? The smoke is again issuing from the fire chimney of the Ifton Rhyn, now Saint Martin's, Colliery; and we shall soon have an opportunity of witnessing the results attainable by the energy, efficiency, and economy brought to bear upon the property by the new company. There is no doubt the future coal field of that region lies along the eastern border of the present collieries, but to develop this deeper portion of the coal field requires, shut off as it is from railway communication, more than an ordinary amount of money, mind, and management.

The chief burden of the brokers' circulars this month is the Cambrian Mines, to which the brokers direct special attention as a safe and lucrative investment by special notes enclosed. I am glad to see the neat sketch map of the Carnarvonshire lead district by Capt. John Roberts that appeared in last week's Journal. I knew the whole region long before it was yeapt D'Eresby. Let us hope the name will be associated with successful mining in the future, otherwise it will be the memento of a fizzle, as the Americans call it. I would rather the former, but the result has to be looked for. Lead mining has in a small way been so successful in the promontory of Llyn, in Carnarvonshire, that I should regard it as an ill omen if correspondents began to cavil and dispute about the mines in that region.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

May 22.—Nothing new has transpired at the mines and works in Derbyshire since my last notice. Trade generally has in no way improved, and a considerable number of men are out of employment. In the lead districts there has been no change of late, and the production of ore is about the average of many weeks past. Pig-iron is in rather moderate request, whilst prices have in no way improved. Bar-iron does not go off very well, but there is still a good consumption of Bessemer, so that hematite pig is extensively used. The works engaged in steel rails are still busy, but prices are low, owing to the competition with other districts. The foundries have been fairly employed in pipes and other castings, whilst the malleable works at Dronfield have been going on steadily. House coal is not in such demand as it has been, even for the London market, but the Claycross and one or two other collieries manage to send something like their usual quantity. Steam coal is rather better than it has been, but it is not so brisk as might be expected for the time of year. Several pits are closed, two of them near to Eckington, owing to the state of trade, and the low price at which coal has to be sold, so that many men are entirely idle. It is not expected that the two pits alluded to in particular will be opened for working during the summer, seeing that the consumption of house coal will gradually decline.

In Sheffield most branches are very quiet, so that whilst many men are working short time, others have nothing to do. Lately a number of puddlers have been discharged from one establishment owing to the shortness of work, so that the forges are not so well employed as they were up to the end of the first quarter of the year. The only department that can be at all called busy is the Bessemer, and all the mills are kept fully going, so brisk is the demand for rails. Makers of table and other cutlery still complain of the little doing, especially for shipment, whilst the file houses are fully as badly off. Not so much crucible steel is being made, for the requirements of the trade has sensibly declined. One or two establishments are pushing energetically steel wheels for colliery purposes, but mineowners just now, owing to the unprofitable nature of the trade, are not disposed to give out orders that can be done without, although admitting that steel is more economical than iron. This being the busy building season, orders have rather freely come to hand for stores, grates, and house fittings, so that some of the foundries are now much busier than they have been during the earlier part of the year. At the Parkgate Works there are signs of an improved state of things, whilst several of the works in the Rotherham and Masborough districts, including those connected with wagon building, are now well employed. In the Barnsley district the iron trade is dull, and the production of the mills has been stopped, owing to a strike resulting in the discharge of men who could not go on for the want of puddled iron. Foundry material has been in very moderate request, so the hands have just managed to make full time. House coal, as might be expected, does not meet with such a ready sale as it has done, whilst prices have a downward tendency in consequence. Steam coal has slightly improved, but at several places considerable stocks are still on the pitbanks. Several pits are now standing, not being in a position to be worked at a profit. Not so much is being done in engine fuel with Lancashire, the consumption having fallen off in consequence of the strike of the cotton operatives, so that fuel is being sent from collieries in the Wigan and other districts into localities where Yorkshire coal has been extensively used. The locomotive works at Leeds are not so busy as they have been, and few orders of any consequence have come to hand of late, and buyers require reduced rates. Some of the works engaged on plates have been doing tolerably well, and boiler makers appear to be doing more than they did. Makers of machines and ordinary tools have been doing tolerably well of late. At the Dodworth Silkstone

Colliery, near to Barnsley, the men are still on strike, and hold frequent meetings, the principal object of which appears to be the abuse of the manager, Mr. Hartley, who is consigned to regions unmentionable by some of the speakers. A considerable number of non-unionists are employed, and they are able to make good wages—some of them, indeed, so much that might make their position enviable by miners in most other districts.

ROCK-BORING MACHINERY REQUIRED.

THE DIRECTORS of DEVON GREAT CONSOLS COMPANY (LIMITED) SOLICIT FULL PARTICULARS from the MANUFACTURERS of ROCK-BORING MACHINERY, &c., for SINKING, DRIVING, or STOPING at the company's mines.

The particulars to be sent to ALEXANDER ALLEN, Esq., Secretary, The Devon Great Consols Company (Limited), 134, Gresham House, Old Broad-street, London, E.C.

WANTED, a RE-ENGAGEMENT AS AGENT or MANAGER, ANALYST, ASSAYER, and SURVEYOR. Has had the management of Mines at home and abroad.

Address, Capt. BURN, Hodbarrow Mines, Millom, Cumberland.

WANTED IMMEDIATELY, a STEADY YOUNG FELLOW, capable of thoroughly ASSAYING and SMELTING COPPER S-O-R-L-E. Must accompany a gentleman abroad. Probable length of absence altogether a fortnight or three weeks. Good references necessary. Wages 10s. a day, and all necessary expenses paid.

Reply to "M." Smith's Bookstall, East Croydon Station, Surrey.

MESSRS. W. REYNOLDS AND CO., STOCK AND SHARE DEALERS, 57, GRACECHURCH STREET, and TALBOT COURT, LONDON, E.C.

LEAD ORES.			
Date.	Mines.	Tons.	Price per ton.
May 21—	Foxdale	110	£17 15 6
	Plympton	20	9 15 0
	West Wye Valley	40	9 17 6
	Roman Gravel	180	10 8 6
	Ladywell	12½	9 3 0
	ditto	12½	9 3 0

BLACK TIN.			
Date.	Mines.	Tons c. q. lb.	Price per ton.
May 21—	West Godolphin	7 4 0	£23 0 0
	ditto	6 3 17	32 10 0

COPPER ORES.			
Sampled May 8, and sold at Swansea, May 21.			
Mines.	Tons.	Produce.	Price.
Seville	129	55½	£2 10 0
ditto	129	55½	2 10 0
ditto	105	63½	3 3 0
ditto	105	63½	3 5 6
ditto	100	65½	2 13 0
ditto	100	65½	2 11 0
ditto	100	65½	2 13 0
ditto	92	65½	2 13 0
Berehaven	68	97½	5 7 6
ditto	84	87½	4 14 6
ditto	84	87½	4 17 0
ditto	75	105½	5 17 0
ditto	75	105½	5 16 0
ditto	22	95½	4 17 0
Cavera	109	6	2 12 0
ditto	109	6	2 12 0
ditto	109	6	2 13 6
Copper Ore	63	5	2 4 6
ditto	62	5	2 3 6
ditto	54	12½	6 11 6
ditto	51	5½	2 14 6

TOTAL PRODUCE.									
Seville Copper	867	2269 9 6	Bogalho	60	£283 10 0				
Berehaven	436	2301 6 0	Telhadella	50	211 0 0				
Cavera	327	896 10 6	Knockmahon	49	267 1 0				
Copper Ore	254	1603 13 0	Italian	42	194 5 0				
Negrillo	164	254 4 0	Tan-y-Bwlch	41	192 0 0				
Vivian and Sons	119	486 12 0	Ashton	16	62 0 0				
Almodovar	95	210 0 0	Copper Ore	26	395 17 0				
Aljustrel	83	186 15 0	Copper Precipitate	1	24 3 0				

COMPANIES BY WHOM THE ORES WERE PURCHASED.			
Names.	Tons.	Amount.	
Copper Miners' Company	267	£1,695 6 6	
P. Grenfell and Sons	214	1,104 13 0	
Nevill, Druce, and Co.	255	1,121 1 0	
Vivian and Sons	810	3,033 3 0	
Williams, Foster, and Co.	612	2,624 19 6	
Mason and Elkington	125	215 0 6	
Charles Lambert and Co.	42	457 17 0	
Sweetland and Co.	95	219 11 6	
Total	2621	£10,541 11 0	

NO SALE ON JUNE 4.			
TOTALS AND AVERAGES.			
Whole sale	31 cwt.	Produce.	Price.
	2621	7½	£4 0 5

COPPER ORES.					
Sampled May 5, and sold at the Royal Hotel, Truro, May 23.					
Mines.			Mines.		
Tons.	Price.		Tons.	Price.	
Devon Great Consols.	105	£1 13 6	Marke Valley	63	£1 17 6
ditto	85	1 15 0	ditto	60	3 10 0
ditto	84	1 12 6	ditto	50	2 11 0
ditto	82	1 11 6	ditto	42	6 4 0
ditto	81	1 16 6	ditto	40	3 4 6
ditto	80	4 12 6	Gunnislake (Clitters)	79	3 14 6
ditto	78	1 12 6	ditto	78	4 13 0
ditto	75	4 3 6	ditto	74	4 16 6
ditto	74	1 11 6	ditto	71	4 15 6
ditto	33	3 12 6	Glasgow Caradon	67	4 18 6
South Caradon	92	2 19 6	ditto	65	4 2 6
ditto	90	2 19 6	ditto	60	3 8 0
ditto	68	2 19 6	ditto	48	3 7 6
ditto	61	8 16 0	Hington Down	83	3 13 6
ditto	60	3 1 0	ditto	70	3 14 0
ditto	59	8 17 0	Bedford United	74	2 17 6
ditto	58	4 13 6	ditto	48	3 19 0
Marke Valley	88	2 10 0	Tavy Consols	82	5 19 0
ditto	64	2 15 6	ditto	10	6 12 6

TOTAL PRODUCE.					
Devon Great Con.	775	£1780 18 0	Glasgow Caradon	240	£957 8 0
South Caradon	480	2218 1 0	Hington Down	183	272 0 6
Marke Valley	405	1289 15 6	Bedford United	120	515 11 0
Gunnislake (Clit.)	392	1303 7 0	Tavy Consols	42	119 3 0
Average standard		£ 87 13 0	Average produce		£ 87 13 0
Average price per ton		2517	Quantity of fine copper	173 tons	11 cwt.
Quantity of ore		2517	Amount of money	£2807 4 0	
LAST SALE.—Average standard			£ 83 2 0	Average produce	£ 87 9 0
Standard of corresponding sale last month			£ 87 9 0	Produce	7

COMPANIES BY WHOM THE ORES WERE PURCHASED.			
Names.	Tons.	Amount.	
Vivian and Sons	603½	£2673 5 1½	
Grenfell and Sons	114½	300 18 10½	
Nevill, Druce, and Co.	451½	1230 5 3	
Williams, Foster, and Co.	651	2170 2 6	
Mason and Elkington	308½	754 19 7½	
Charles Lambert and Co.	380½	1077 11 7½	
Total	2617	£8207 4 0	

NO SALE ON Thursday next, May 30.

Copper ores for sale on Thursday week, at Tabbs Hotel, Redruth.—Mines and parcels.—Mellanar 390—West Wheal Tolgus 324—East Pool 232—West Wheal Seton 211—South Croft 127—Wheal Bassett 43—Carn Brea 40—West Bassett 25—North Trekerby 25—Penstruthal 13—Thomas's Ore 3.—Total, 1433 tons.

WEST ROSKEAR.—There is a most promising lode in the 12 ft. level, 3 ft. of which is of copper, lead, and blende. This level has for many fathoms shown the most encouraging features for an important discovery at a deeper level. The 60-inch pumping-engine is expected to go to work by Midsummer, when the 24 will at once be driven to get under the favourable indications in the 12.

AMERICAN STEAM-ENGINES FOR ENGLAND.—Advices from New York state that Messrs. Marshall Brothers, of Pittsburgh, Pennsylvania, are building two double cylinder engines, one of which is for a firm in London. The engines are made almost entirely of cast steel.

COAL MINES REGULATION ACT, 1872.

EXAMINATION FOR MANAGERS' CERTIFICATES OF COMPETENCY.
DISTRICT UNDER THE CHARGE OF FRANK N. WARDELL, Esq.,
H.M. INSPECTOR OF MINES.

NOTICE IS HEREBY GIVEN, that an EXAMINATION for MANAGERS' CERTIFICATES OF COMPETENCY, under the above-named Act, will be held on the 25th day of June next, and CANDIDATES INTENDING TO PRESENT THEMSELVES at such Examination must, on or before the 3rd day of June next, notify such intention to the Secretary of the Board of the above-mentioned District, from whom all information as to particulars can be obtained.
By order of the Board,
JOHN R. JEFFERY, Secretary,
6, Piccadilly, Bradford.

N.B.—Persons who do not reside within the District are equally eligible for examination with those who do.

COAL MINES REGULATION ACT, 1872.

EXAMINATION FOR MANAGERS' CERTIFICATES OF COMPETENCY.
DISTRICT UNDER THE CHARGE OF HENRY HALL, Esq.,
H.M. INSPECTOR OF MINES.

NOTICE IS HEREBY GIVEN, that an EXAMINATION for MANAGERS' CERTIFICATES OF COMPETENCY, under the above-named Act, will be held on the 25th day of June next, and CANDIDATES INTENDING TO PRESENT THEMSELVES at such Examination must, on or before the 3rd day of June next, notify such intention to the Secretary of the Board of the above-mentioned District, from whom all information as to particulars can be obtained.
By order of the Board,
MASELL W. PEACE, Secretary,
19, King-street, Wigan.
N.B.—Persons who do not reside within the District are equally eligible for examination with those who do.

SOUTH AURORA CONSOLIDATED MINING COMPANY (LIMITED).

Notice is hereby given, that the ORDINARY GENERAL MEETING of the South Aurora Consolidated Mining Company (Limited) will be held at the Cannon-street Hotel, Cannon-street, in the City of London, on FRIDAY, the 31st day of May, 1878, at Two o'clock in the afternoon, to receive and consider the report of the directors, to consider and adopt the accounts and balance-sheet, to elect a director in the place of the director retiring by rotation, and to appoint an auditor.

Mr. Edward Applegarth, the director retiring by rotation, being eligible, offers himself for re-election.
Mr. Ford, the auditor, also offers himself for re-election.
By order of the Board,
CHARLES CADOGAN, Secretary.
Dated this 23rd day of May, 1878.

SOUTH AURORA CONSOLIDATED MINING COMPANY (LIMITED).

Notice is hereby given, that an EXTRAORDINARY GENERAL MEETING of the South Aurora Consolidated Mining Company (Limited) will be held at the Cannon-street Hotel, Cannon-street, in the City of London, on FRIDAY, the 31st day of May, 1878, at Two o'clock in the afternoon, immediately after the conclusion of the Ordinary General Meeting, when the following special resolutions will be submitted to the meeting, viz.:

- 1.—That this company be wound up voluntarily.
- 2.—That Mr. Louis Berghell, public accountant, and Mr. Charles Cadogan, secretary of the company, be appointed liquidators, and that their remuneration be fixed at the sum of £50 each.
- 3.—That this company approve the following scheme of reconstruction, viz.:
- 4.—That a new company be incorporated under the name of The Consolidated Mining Company (Limited), with a capital of £100,000, divided into 100,000 shares of £1 each, the whole of which are to be issued as fully paid up shares for the purpose of taking over the business, assets, and liabilities of this company in exchange for 90,000 shares in the new company, which are to be distributed among the members of this company in exchange for their existing shares, in the proportions of three shares in the new company for every two shares in this company; the remaining 10,000 shares in the new company to be applied, so far as may be, in acquiring by way of exchange the shares in the Olmetta Copper Company of Corsica (Limited) and the Lama Company of Corsica (Limited) respectively, not already held by or on behalf of this company; and any balance of shares of the new company which may not be required for the above purposes to be dealt with as the Board of Directors of the new company may determine.
- 5.—That the liquidators be and they are hereby authorised to concur with any other person or company in the incorporation of a new company for the purpose of carrying into effect the above scheme, or any reasonable modification of the detailed terms thereof, which they may find convenient in carrying out the substantial terms thereof, and that, pursuant to Section 161 of the Companies Act, 1862, the liquidators be and they are hereby empowered to transfer or sell the business and property of this company to such new company, and to receive in compensation for such transfer or sale 90,000 fully paid-up shares of £1 each in the capital of such new company, for the purpose of distribution amongst the members of this company, pursuant to the above mentioned scheme.
- 6.—That the purchase money for the interest of any dissentient member be allotted to such member, or out of such funds and by such means as the liquidators and the new company may agree upon.
- 7.—For the purpose of the above scheme, the draft agreement intended to be made between the liquidators of the one part, and Arthur G. D. Griffith, a trustee, on behalf of the new company, of the other part, and also the draft memorandum and Articles of Association of the new company respectively, submitted to this meeting and which are identified respectively by the signature of the Chairman of this meeting at the foot thereof are respectively approved.

By order of the Board,
CHAS. CADOGAN, Secretary.
Dated this 23rd day of May, 1878.

C. H. WALKER AND CO.,

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VALPARAISO AND SAN IAGO,
CHILE.

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NEAR LEICESTER.

MESSRS. WARNER, SHEPPARD, AND WADE have received Instructions TO SELL, BY AUCTION, upon the premises of Mr. Morris, Spinney Hills, on Thursday, the 28th day of June next, at Three for Four o'clock in the afternoon (in consequence of the boring being carried on by the Diamond Rock-Boring Company's Machinery), ALL the

VALUABLE BORING PLANT.

Lately employed in the search for coal at Evington, and consisting of strong timber derrick, top wheel, winding drum, flat ropes, brake wheels, shaft, and shifting gear, frames, rod rests, wrenches, clutches, with trains of gearing, &c., &c., the whole forming a complete PLANT, capable of carrying a boring to a depth of 1500 feet.
Also, PORTABLE STEAM ENGINE, with driving pulleys, belts, &c., fan for forge with driving gear, 25-light gas apparatus complete, augurs, extracting tools, complete set of rods and wrought-iron casing, core boxes, men's beds and bedding, and all the requisite tools and appliances, together with wooden shed 60 ft. by 20 ft., brick and slated dwelling rooms with boarded floors.
The Humberstone-road Tramway Terminus is only five minutes walk from the place of sale, and the lots can be viewed on the day previous and the day of sale.
Catalogues and further particulars can be obtained from the Auctioneers, Horse-fair-street, Leicester.

TO BE SOLD, BY PUBLIC AUCTION, under Decree of the Supreme Court of Newfoundland in Equity, in a suit between CHARLES FOX BENNETT, Plaintiff, and SMITH MCKAY and LEANDER GILL, Defendants, on Monday, the 2nd day of September next, at Twelve o'clock noon (if not previously disposed of by private sale), at the Court House, in St. John's, Newfoundland, that VALUABLE COPPER MINE and MINING PROPERTY called and known as the

UNION MINE.

Situate on the east and west sides of Tilt Cove, on the north side of Notre Dame Bay or Green Bay, Newfoundland, and near Cape John, with all ERECTIONS, IMPROVEMENTS, PLANT, and OTHER PROPERTY and EFFECTS thereto appertaining.
The mine is held under grant in fee from the Government of Newfoundland, containing two miles in length, by half a mile in breadth; a Licence of Occupation from the said Government, containing one mile square, west of and adjoining the Crown grant and land held under conveyance of fee-simple interests of former owner.

The title-deeds and documents, and plans and surveys of the property may be seen, and further information may be obtained, by application to PRESCOTT EMERSON, Esq., Q.C., Master-in-Chancery, at his office, in St. John's; or to either of the undersigned solicitors for the parties, or to either of the parties.
Conditions of sale will be published hereafter.

PRESCOTT EMERSON, Q.C., Master-in-Chancery,
St. John's, Newfoundland, January 23rd, 1878.
For further particulars, apply to C. T. BENNETT, Esq., No. 55, Queen's-square, Bristol; Messrs. HENRY BATH AND SON, Gresham House, London; or to FISKE and GREENE, Solicitors to the Plaintiff; WINTER AND CARTER, Solicitors for Defendant McKay.

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Mr. Thomas Poole, the steward of Woodlands, Clonsilla, will show the ground to persons desirous of inspecting the same on their producing a reference from any respectable merchant or firm.

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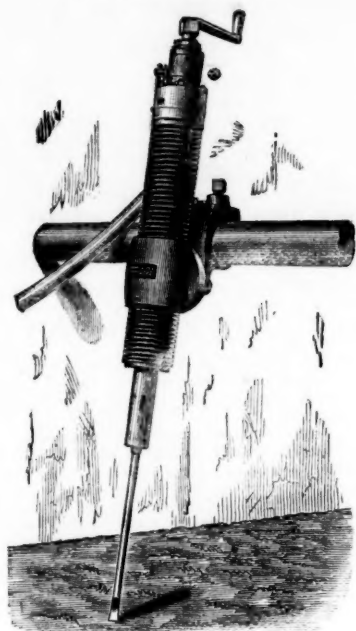
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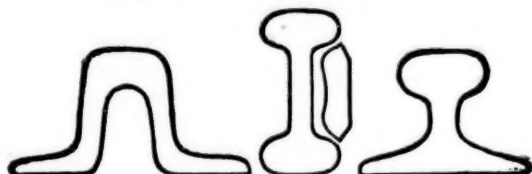
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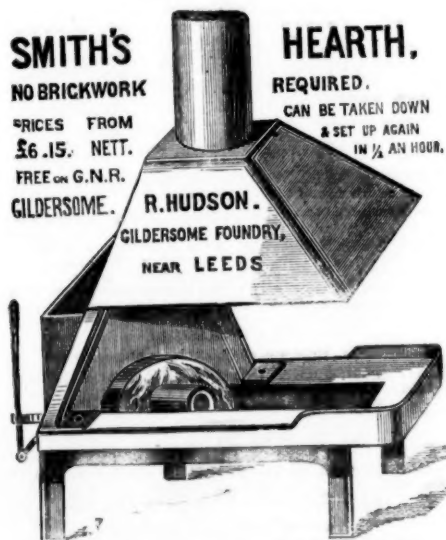
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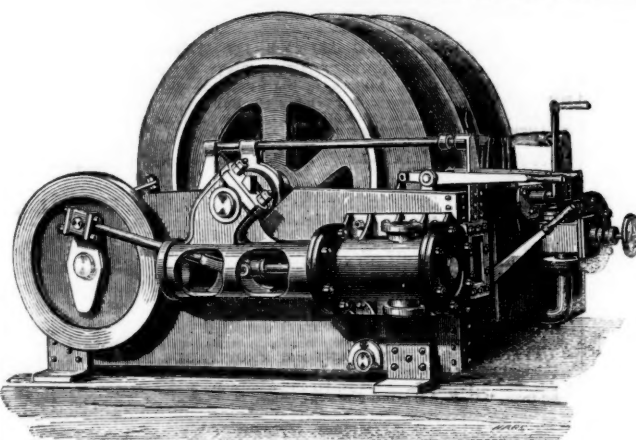
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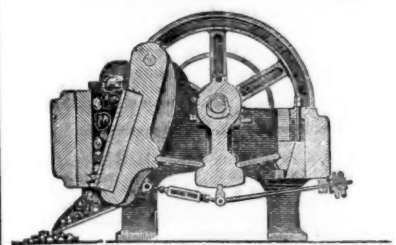
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BRITISH DIVIDEND MINES.

Shares.	Mines.	Paid.	Last wk.	Clos. pr.	Total divs.	For sh.	Last pd.
1500	Alderley Edge, Cheshire	10 0 0	—	—	12 11 8	0 5 0	Jan. 1878
4000	Brookwood, Buckfastleigh	1 16 0	—	—	3 16 0	0 2 0	Nov. 1878
2000	Bryn Alyn, Denbigh	10 0 0	—	—	0 7 0	0 0 0	Jan. 1877
400	Cathwell, Cumberland	2 10 0	—	—	1 9 0	0 2 0	Aug. 1876
1000	Carn, Denbigh	36 7 6	—	—	308 0 0	1 0 0	Feb. 1878
2450	Cook's Kitchen, Denbigh	24 4 9	—	—	11 17 0	0 7 0	Jan. 1877
10240	Devon Gr. Consols, Tavistock	1 0 0	—	—	116 15 0	0 5 0	July 1877
4296	Dolomath, Camborne	10 14 10	—	—	112 6 3	0 10 0	Mar. 1878
8000	East Black Craig, Scotland	8 0 0	—	—	0 10 0	0 10 0	Feb. 1877
300	East Darnley, Cardiganshire	82 0 0	—	—	285 10 0	1 0 0	Aug. 1876
6100	East Pool, Denbigh	0 9 9	—	—	15 9 3	0 2 0	May 1878
40 100	Glasgow Carron, 10,000 p. 10,000	13 0 0	—	—	0 13 4	0 0 0	Feb. 1877
7500	Gorsefield and Merilyn Cons., Flint	2 10 0	—	—	0 5 0	0 5 0	Aug. 1877
15000	Great Oylife, Montserrat	4 0 0	—	—	0 2 0	0 2 0	Apr. 1878
1000	Great Laxey, Leicestershire	4 0 0	—	—	23 11 0	0 0 0	Apr. 1878
615	Gr. Retallack, Denbigh	18 6 0	—	—	0 1 6	0 1 6	May 1878
6400	Green Harth, Durham	0 5 0	—	—	1 18 0	0 3 0	Mar. 1878
20000	Groswinning, Cardiganshire	2 0 0	—	—	0 14 0	0 2 0	Jan. 1878
9330	Guinalake (Ollerton), Denbigh	5 6 0	—	—	0 13 9	0 1 0	Oct. 1876
60000	Holmshale, Cardiganshire	1 0 0	—	—	0 4 6	0 0 0	Sept. 1877
2400	Ile of Man, Isle of Man	0 0 0	—	—	82 5 0	0 10 0	Feb. 1877
30000	Leadville, Lancashire	0 0 0	—	—	0 15 0	0 3 0	Mar. 1878
400	Lisbon, Cardiganshire	18 15 0	—	—	535 10 0	1 0 0	Nov. 1878
14000	Llanidloes, Montgomery	3 0 0	—	—	0 9 0	0 4 0	Nov. 1876
9000	Marke Valley, Llanidloes	5 3 8	—	—	7 15 0	0 2 0	Jan. 1878
10000	Mellancor Copper, Hayle	2 0 0	—	—	0 2 0	0 2 0	Jan. 1878
9000	Minera Mining Co., Wrexham	5 0 0	—	—	67 13 0	0 2 0	May 1878
20000	Mining Co. of Ireland, Cl. & L.	7 0 0	—	—	23 17 0	0 2 0	Jan. 1878
444	North Bury, Cheshire	3 9 0	—	—	1 10 0	0 1 0	July 1877
10 289	North Humber, Wales	2 1 0	—	—	2 2 0	0 10 0	Mar. 1878
30000	Panty Mwyn, Mold (8794 sh.)	2 0 0	—	—	0 1 0	0 1 0	Feb. 1877
6000	Pedra-an-dra, Redruth	0 8 6	—	—	0 9 0	0 9 0	June 1877
5000	Pennant, St. Agnes	3 2 6	—	—	3 13 6	0 2 0	July 1877
8000	Pennant, St. Agnes	5 0 0	—	—	0 10 0	0 5 0	Mar. 1878
45783	Pennant, St. Agnes	2 0 0	—	—	0 2 8	0 8 0	Nov. 1876
10000	Prince Patrick, Holywell	1 0 0	—	—	0 14 0	0 1 3	Jan. 1878
10000	Red Rock, Cardiganshire	2 0 0	—	—	0 4 0	0 2 0	Mar. 1878
12000	Roman Gravel, Salop	7 10 0	—	—	7 15 0	0 5 0	Jan. 1878
512	South Cardon, St. Cleer	1 5 0	—	—	742 10 0	1 0 0	Mar. 1878
6123	South Cardon, St. Cleer	6 6 0	—	—	3 13 0	0 1 0	Apr. 1878
12000	St. Harmon, Montserrat	3 0 0	—	—	0 6 0	0 3 0	July 1877
1 000	St. Patrick, St. Agnes	1 0 0	—	—	0 7 0	0 1 0	Oct. 1876
1 000	St. Patrick, St. Agnes	6 0 0	—	—	4 17 0	0 5 0	Dec. 1876
5000	St. Patrick, St. Agnes	9 0 0	—	—	50 8 6	0 5 0	May 1877
15000	Van, Llanidloes	4 0 0	—	—	22 15 0	0 12 0	Jan. 1878
3000	W. Chiverton, Perranarabuth	12 10 0	—	—	55 10 0	0 10 0	Feb. 1878
1785	West Fildes, St. Day	10 0 0	—	—	1 19 0	0 4 0	July 1878
512	West Fildes, St. Day	10 0 0	—	—	28 5 0	1 10 0	May 1878
2048	West Fildes, St. Day	95 10 0	—	—	3 16 0	0 5 0	Oct. 1876
600	West Fildes, St. Day	28 1 3	—	—	0 12 0	0 15 0	Apr. 1878
12000	West Fildes, St. Day	47 0 0	—	—	18 0 0	0 3 0	Nov. 1877
1024	Wh. Eliza Consols, St. Austell	3 0 0	—	—	8 5 0	0 6 0	Apr. 1878
2048	Wh. Eliza Consols, St. Austell	18 0 0	—	—	11 16 0	0 2 0	Dec. 1874
4296	Wh. Eliza Consols, St. Austell	2 15 10	—	—	0 8 0	0 6 0	Sept. 1877
25000	Wh. Eliza Consols, St. Austell	1 0 0	—	—	522 10 0	0 4 0	Aug. 1878
3000	Wh. Eliza Consols, St. Austell	98 15 0	—	—	0 5 0	0 5 0	Apr. 1878
10000	Wye Valley, Montgomery	8 0 0	—	—	0 4 0	0 1 0	July 1877

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Shares.	Mines.	Paid.	Last wk.	Clos. pr.	Total divs.	For sh.	Last pd.
3550	Almaden, Spain	2 0 0	—	—	1 19 3	0 1 0	April 1878
80000	Almaden, Spain	1 0 0	—	—	0 8 3	0 1 0	May 1878
20000	Australian, South Australia	7 7 8	—	—	0 19 6	0 1 0	July 1877
10000	Battle Mountain, California	8 0 0	—	—	0 10 0	0 10 0	Nov. 1877
15000	Birdseye Creek, California	7 0 0	—	—	0 14 0	0 2 0	June 1878
20000	Cape Copper Mining, S. Africa	7 0 0	—	—	0 5 0	0 2 0	June 1878
34433	Cedar Creek, California	5 0 0	—	—	0 10 0	0 3 0	Aug. 1878
85000	Cesena Sul. Co., Romagna, Italy	10 0 0	—	—	2 8 0	0 4 0	Nov. 1877
65000	Colorado, U.S.	10 0 0	—	—	17 15 0	0 3 0	Jan. 1878
10000	Copahu, Chile	8 0 0	—	—	7 11 5	0 4 0	May 1877
100000	Don Pedro, North of Rey	0 18 0	—	—	2 8 0	0 2 0	Mar. 1877
23500	Eberhardt & Aurora, Nevada	10 0 0	—	—	1 8 0	0 3 0	Dec. 1877
7000	English & Australian, S. Aust.	2 10 0	—	—	2 15 0	0 1 0	Mar. 1877
10000	Flanagan, Spain	10 0 0	—	—	4 12 0	0 5 0	July 1878
25000	Fortuna, Spain	2 0 0	—	—	0 10 0	0 5 0	Apr. 1878
50000	Frontino & Bolivia, New Granada	2 0 0	—	—	0 2 4	0 0 0	Oct. 1877
80000	Gold Run, U.S.	1 0 0	—	—	0 2 4	0 0 0	June 1878
88000	Kapunda Mining Co., Australia	1 3 0	—	—	0 14 0	0 2 0	July 1878
20000	Last Chance, Utah	5 0 0	—	—	0 1 0	0 1 0	Jan. 1878
15000	Llanes, Spain	8 0 0	—	—	17 10 0	0 2 0	July 1878
65000	London and California, U.S.	3 0 0	—	—	0 1 0	0 1 0	July 1878
7887	Lusitania, Portugal	5 10 0	—	—	0 11 6	0 1 0	Mar. 1878
5000	Mamm. Copperopolis of Utah	10 0 0	—	—	0 8 0	0 5 0	Oct. 1877
5000	Mountain Chief, Utah	10 0 0	—	—	0 4 0	0 4 0	Nov. 1877
10000	Portgibaud, France	20 0 0	—	—	25 8 0	1 11 0	Jan. 1878
100000	Port Phillip, Cl. & L.	1 0 0	—	—	1 10 0	0 1 0	Jan. 1878
84000	Richmond Consols, Nevada	5 0 0	—	—	4 11 6	0 7 0	May 1878
40000	Santa Barbara, Brazil	0 10 0	—	—	0 4 9	0 1 0	May 1878
10000	Scottish Australian Mining Co.	1 0 0	—	—	15 0 0	0 2 0	Nov. 1877
112500	Sierra Butte, California	2 0 0	—	—	1 18 0	0 2 0	Oct. 1877
60000	South Aurora, Nevada	5 0 0	—	—	0 14 2	0 2 0	Nov. 1878
235000	St. John del Rey, U.S.	5 0 0	—	—	0 12 0	0 6 0	May 1874
20000	Tolima, S. America	5 0 0	—	—	0 12 0	0 6 0	Jan. 1878
25000	Victoria (London), Australia	1 0 0	—	—	0 12 0	0 12 0	Jan. 1878
10000	Western Andes, S. America	1 0 0	—	—	1 8 0	0 4 0	Jan. 1878
91000	W. Prussian (5000 pref. sh. 107 pd.)	10 0 0	—	—	—	—	—

NON-DIVIDEND FOREIGN MINES.

Shares.	Mines.	Paid.	Last wk.	Clos. pr.	Total divs.	For sh.	Last pd.
12000	Angellia Phosphate, West Indies (4000 issued)	10 0 0	—	—	—	—	—
3000	Argentina, Argentine Republic	10 0 0	—	—	—	—	—
80000	Bellavista, Peru (410 shares)	10 0 0	—	—	—	—	—
49955	Blue Tent, U.S.	5 0 0	—	—	—	—	—
16000	Chontales, S. America	2 0 0	—	—	—	—	—
30000	Condes de Chili, S. America	5 0 0	—	—	—	—	—
35000	English Australian, U.S.	1 0 0	—	—	—	—	—
100000	Exchequer, S. California	6 0 0	—	—	—	—	—
40000	Holcombe Valley, S. California	1 0 0	—	—	—	—	—
8000	Hornachos, S. America	1 0 0	—	—	—	—	—
12000	Hultafall, S. Sweden	10 0 0	—	—	—	—	—
12000	Hunter Consolidated, S. Utah	5 0 0	—	—	—	—	—
20000	Imperial Brazilian Collieries, Brazil	10 0 0	—	—	—	—	—
100000	J. & L., S. California	5 0 0	—	—	—	—	—
50000	Jarvis, S. California	2 0 0	—	—	—	—	—
3500	La Manche, Newfoundland	10 0 0	—	—	—	—	—
12000	Lanerosa, S. America	10 0 0	—	—	—	—	—
75000	Malabar, S. America	1 10 0	—	—	—	—	—
40000	Malpas, S. America	1 0 0	—	—	—	—	—
12000	Menzelberg, S. Germany	1 0 0	—	—	—	—	—
4588	New Benaig, S. Germany	8 0 0	—	—	—	—	—
60000	New Queensland, S. Australia	5 0 0	—	—	—	—	—
20000	New Zealand Kapanga, S. Australia	5 0 0	—	—	—	—	—
3000	Oregon, S. America	5 0 0	—	—	—	—	—
50000	Panulillo, S. America	4 0 0	—	—	—	—	—
50000	Pastorale United, S. Italy	3 0 0	—	—	—	—	—
50000	Providencia and New Rosario, S. Mexico	1 0 0	—	—	—	—	—
8000	Rica, S. America	1 0 0	—	—	—	—	—
2,131,000	Rio Tinto, S. America	1 0 0	—	—	—	—	—
100000	Rosa Grande, S. Brazil	1 0 0	—	—	—	—	—
30000	Russia Copper, Orenburg and Ufa	0 19 0	—	—	—	—	—
25000	San Pedro, S. America	10 0 0	—	—	—	—	—
10000	Silver Flame, S. Colorado	2 0 0	—	—	—	—	—
50000	Tecoma, S. Utah	1 0 0	—	—	—	—	—
43174	United Mexican, S. Mexico	10 0 0	—	—	—	—	—
15000	Utah, S. America	29 0 3	—	—	—	—	—
50000	Virneberg, S. Germany	5 0 0	—	—	—	—	—
75000	Yorke Peninsula, S. Australia	1 15 0	—	—	—	—	—
40000	Yorke Peninsula, S. Australia	1 0 0	—	—	—	—	—

Have made calls since last dividend was paid

FOREIGN AND MISCELLANEOUS STOCKS, BONDS, LOANS, AND TRUSTS.

CLOSING STOCKS, BONDS, LOANS, AND TRUSTS.			
	Closing Prices.		Closing Prices.
Argentina, 1888, 6 percent.	74 75	Foreign and Col. Gov. Trust, 6 p. c.	62 66
Bolivia, 6 percent.	25 26	Do., 5 percent, 2d issue	55 55
Brazilian, 1885, 5 percent.	90 92	Do., 6 percent, 3d issue	55 60
Chilian, 1887, 7 percent.	103 105	Do., 1872, 4th issue	55 60
City of Providence, 6 p.c. coupon bonds	100 102	Do., 1873, 5th issue	60 55
Egyptian, Gov. preference	63 63 1/2	Peruvian, 1870, 6 percent.	52 57
Do., unified debt scrip	40 40 1/2	Do., 1872, 6 percent.	15 15 1/2
Do., 7 percent, V.M.L.	75 78	Russian, 4 percent, S. Mor.	68 72
Do., 8 percent, guar.	74 75	Spanish, Quicksilver Mort., 6 p. c.	85 100
Do., K. Dairs Sanich	45 47	United States Mort., 6 percent.	100 102